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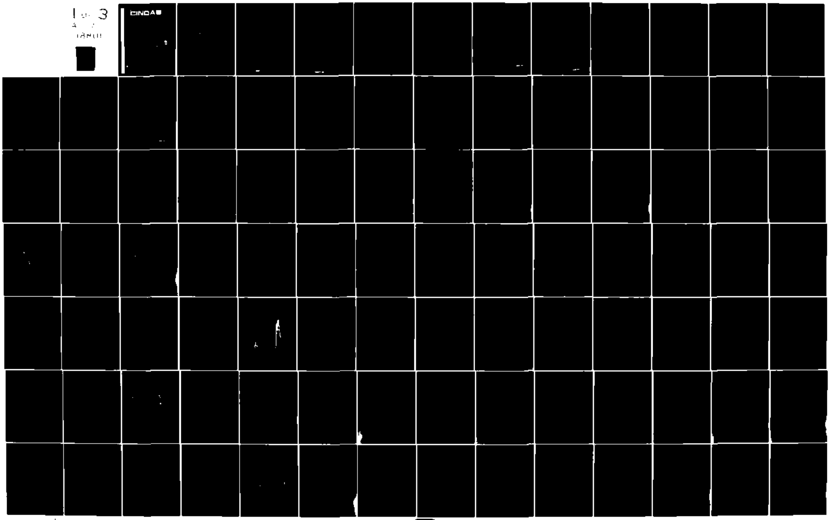

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ABSORPTION COEFFICIENT OF ALKALI HALIDES (PART I)

By

H. H. LI

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CINDAS-REPORT 54

March 1979

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Data on absorption coefficients of alkali halides were complied and analyzed. The bulk of available data were concentrated to the absorption edges of the main transparent region and were for the seven materials LiF, NaF, NaCl, KCl, KBr, KI, and CsI. Although the intrinsic absorption can be calculated by using the exponential dependence of absorption coefficient on frequency, discrepancies occur in the region where absorption is extremely low. At low absorption levels, extrinsic absorptions due to impurities and surface contamination domin-

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ate the intrinsic absorption by factors ranging from fractions to factors by ten. Experience has shown that extrinsic contributions can be reduced through improved crystal preparation. Another possible reason for the discrepancies may be the limit of instrument sensitivity. The results of this work on the alkali halides are given in two separate reports. Presented in this report are essentially the up-to-date knowledge of available data and the recommended room-temperature values of absorption coefficient in the laser wavelength and multiphonon absorption regions. In the second report, results on the data analysis and theoretical studies for the temperature dependence of absorption coefficient will be given.

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ABSTRACT

Experimental data on the absorption coefficient of alkali halides were searched, compiled, and analyzed. It was found that the bulk of available data were concentrated to the absorption edges of the main transparent region and were for the seven materials LiF, NaF, NaCl, KCl, KBr, KI, and CsI. Although the intrinsic absorption can be calculated by using the exponential dependence of absorption coefficient on frequency which is formulated on the basis of available data, discrepancies occur in the region where absorption is extremely low, as observed at the wavelengths of interest to laser technology. At low absorption levels, extrinsic absorptions due to impurities and surface contamination dominate the intrinsic absorption by factors ranging from fractions to factors by ten. Experience has shown that extrinsic contributions can be reduced through improved crystal growing and surface polishing techniques. Another possible reason for the discrepancies may be the limit of instrument sensitivity, since absorption coefficient lower than 7 x 10^{-6} cm^{-1} cannot be detected with certainty.

The results of this work on the alkali halides are given in two separate reports. Presented in this report are essentially the up-to-date knowledge of available data and the recommended room-temperature values of absorption coefficient in the laser wavelength and multiphonon absorption region. In the second report, results on the data analysis and theoretical studies for the temperature dependence of absorption coefficient will be given.

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Key Words: absorption coefficient, optical constants, alkali halides.

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LIST OF SYMBOLS

A	constant
B	constant
c	constant
C	constant; calorimetric method
d	thickness of specimen
E	energy in units of eV
E_o	constant
E_a	energy absorbed
E_T	energy transmitted
f	frequency of radiation
h	Plank constant
k	Boltzmann constant
L	length of specimen
n	refractive index
R	apparent reflectivity; reflection method
R_∞	reflectivity at normal incidence without contribution from multiple internal reflection
$\bar{R}$	complex reflectivity
S_i	strengths of the ith oscillator
t	thickness of specimen
T	temperature; trnamission method
Z	transmission and reflection method

<u>Greek Symbols</u>

α	absorption coefficient in units of cm^{-1}
α_o	constant
γ	phase angle

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γ_i	damping factor of the ith osciliator
ε	complex dielectric constant
ε_1	real part of complex dielectric constant
ε_2	imaginary part of complex dielectric constant
θ	phase angle
κ	absorption index
λ	wavelength in units of μm
ν	wavenumber in units of cm^{-1}
σ	absorption per surface
σ_s	steepness parameter in Urbach relations
σ_{so}	constant
τ	transmission
τ_∞	transmission at normal incidence without contribution from multiple internal reflection
ψ	phase change upon reflection
ω	frequency of radiation
ω_i	frequency of the ith oscillator

1. INTRODUCTION

The purpose of this work is to present and review the available data and information on the absorption coefficient of alkali halides, to critically evaluate, analyze, and synthesize the data, and to make recommendations for the most probable values of the absorption coefficient. The investigation covers the widest possible wavelength and temperature ranges and is based on the purest samples of alkali halides.

The need for ultraviolet and infrared photographic and detecting devices and the development of high-energy lasers and their associated applications have resulted in requirements for a wide variety of highly transparent optical components, such as windows, lenses, and polarizers. In selecting materials of practical importance, one is concerned with the transparent region which covers various lines of interest. For a given crystal, the width of the main transparent region is governed by two factors. On the short wavelength side, transmission is restricted by electronic excitation, and for long wavelengths by molecular vibrations and rotations. The width of the transparent spectral range increases as the energy for electronic excitation is increased and that for molecular vibrations decreased. Theoretical and experimental studies on the ionic crystals indicate that crytslas having small ions with strong bonding have a wide ultraviolet transparency; this is true for alkali halides. In Figure 1, a schematic view of the absorption spectrum of a typical alkali halide crystal is shown. At the right ($\sim$40 μm) are seen the absorption peaks associated with optical phonons while nearer to the left ($\sim$0.15 μm) are seen the absorption peaks associated with excitons. It is seen that the transparent region of alkali halides covers a spectral range that is suitable to most practical applications.

The alkali halides are typical ionic compounds and their physical properties are in general well understood. The majority of the alkali halides crystallize in the rock salt structure in which each cation (alkali metal ion) is surrounded by six nearest neighbor anions (halogen ions), and each anion by six nearest neighbor cations. The cations and anions are each situated on the points of separate face-centered cubic lattices, and these two lattices are interleaved with each other. This type of crystal is called the β-form. A few of the alkali halides normally crystallize in a slightly different arrangement,

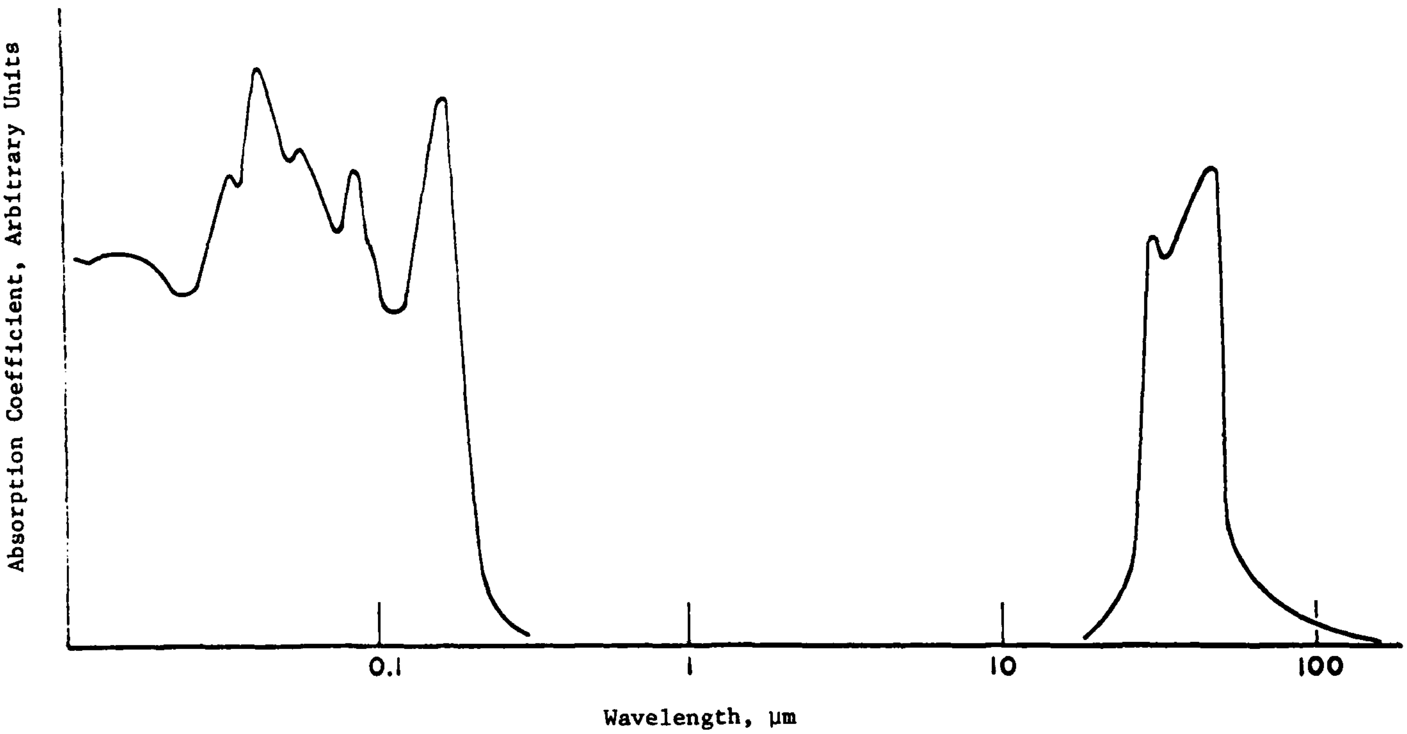

Figure 1. Typical Absorption Spectrum of an Alkali-Halide Crystal

typified by the room-temperature structure of cesium chloride. In this structure, each cation is surrounded by eight nearest neighbor anions and conversely. The cations and anions in this structure may be considered to occupy, respectively, the points of two inter-penetrating simple cubic lattices. This type of crystal is called the α-form. A few physical properties of alkali halide crystals are listed in Table 1.

The applications of high-power infrared lasers, which are now being developed at a rapid rate, are largely limited by the lack of suitable transparent optical materials. As a result, much of the high-power laser research is directed toward finding adequate high-temperature window and dome materials in the wavelength region of 2 to 6 μm and near 10.6 μm. The alkali halides have large transmission ranges from the ultraviolet to the infrared and are available in large sizes and high purity. They are excellent materials for photochemists who are interested in ultraviolet transparency and for laser scientists who are considered with infrared transmission. In spite of their intrinsic physical weaknesses, they are considered good window materials and are recommended by the National Materials Advisory Board [1]. Efforts are being made to improve their mechanical strength and thermal endurance without altering their optical properties.

Among the various optical properties, those of practical importance are refractive index and absorption coefficient. The latter is especially important in the application of high-energy lasers because many unfavorable effects, which are not observed at low energy level, are developed at high power levels. No matter how low the absorption is, the effect is objectionable at high-energy levels. As a natural consequence, the magnitude of absorption coefficient is the key parameter in selecting the laser window materials.

Over the past years extensive theoretical and experimental investigations have been conducted in an effort to determine the absorption property for optical materials and to identify the mechanisms influencing the absorption. As a result, numerous measurements and calculations have been reported. However, the available information is dispersed through the literature chronologically as well as geographically. A concise and comprehensive literature survey, data compilation, and analysis is still not available. Yet the overall profile of the available data and predictions of most probable values are indispensible for scientific research and engineering applications. Because of this reason,

TABLE 1. SOME PHYSICAL PROPERTIES OF ALKALI HALIDES

Material	Structure[a]	Space Group[a]	Density[a] (g cm^{-3})	Melting[c] Point (K)	Energy[d] Gap (ev)	Solubility[b] in Water at 298 K (10^{3} g cm^{-3})	Molecular Weight[c]	Linear[a] Exp. Coef. at 293 K (10^{-6} K^{-1})	Thermal[e] Conductivity at 293 K (W m^{-1} K^{-1})	Specific[c] Heat at 298 K (cal mole^{-1} K^{-1})	Transmission[e] Region (μm)	Young's[e] Modulus (10^{10} N m^{-2})	Hardness[e] (Knoop No.)
LiF	Cubic(NaCl)	Fm3m	2.601	1121.3	13.1	0.27	25.9374	33.2		9.994	0.12-9.0	6.481	102-113
LiCl	Cubic(NaCl)	Fm3m	2.06_8	883 ± 2	~10	63.7	42.397	43.8		11.479			
LiBr	Cubic(NaCl)	Fm3m	3.46_4	823	~ 8.5	145.0	86.848	49.8		11.092			
LiI	Cubic(NaCl)	Fm3m	4.06_1	742	≥ 5.9	165.0	133.8434	59.4		11.970			
NaF	Cubic(NaCl)	Fm3m	2.79	1269 ± 2	10.5	4.22	41.9882	31.7		11.198	0.19-15.0		
NaCl	Cubic	Fm3m	2.16_4	1073.8 ± 1.0	8.97	35.7	58.448	39.7	6.4	12.072	0.21-26.0	3.990	19.2
NaBr	Cubic(NaCl)	Fm3m	3.210	1020	7.7	116.0	102.907	42.3		12.285			
NaI	Cubic(NaCl)	Fm3m	3.665	933	≥ 5.8	184.0	149.901	45.5		12.482			
KF	Cubic(NaCl)	Fm3m	2.505	1131	10.9	92.3	58.1004	34.8		11.707			
KCl	Cubic(NaCl)	Fm3m	1.9917	1044	8.5	34.7	74.555	37.1	7.0	12.258	0.21-30.0	2.965	9.3
KBr	Cubic(NaCl)	Fm3m	2.754	1007	7.6	53.48	119.011	38.7	5.0	12.500	0.25-40.0	2.689	7.0
KI	Cubic(NaCl)	Fm3m	3.114	954	6.2	127.5	166.0064	40.8	3.1	12.614	0.25-45.0	3.151	
RbF	Cubic(NaCl)	Fm3m	2.88	1033	10.4	130.6	104.47	27.5					
RbCl	Cubic(NaCl)	Fm3m	2.76	958	8.3	77.0	120.92	36.0					
RbBr	Cubic(NaCl)	Fm3m	3.35	955	7.7	98.0	165.38	37.5					
RbI	Cubic(NaCl)	Fm3m	3.55	915	5.83	152.0	212.37	41.5					
CsF	Cubic(NaCl)	Fm3m	3.58_6	976	10.0	367.0	151.9034	32.0		12.420			
CsCl	Cubic	Pm3m	3.988	tr. 743	≥ 8.0								
CsCl(β)	Cubic(NaCl)	Fm3m	3.54(calc.)	918	≥ 7.5	162.22	168.358	46.3		12.534			
CsBr	Cubic(CsCl)	Pm3m	4.43_3	909	7.0-8.0	124.3	212.81	47.4	0.94		0.3 -55.0	1.586	19.5
CsI	Cubic(CsCl)	Pm3m	4.51	894	≥ 6.3	44.0	259.81	49.0	1.2		0.25-50.0	0.530	

[a] Information is taken from American Institute of Physics Handbook, 3rd Edition, Ref. [2], except the linear expansion coefficients of six materials; those of KF, RbF are from Ref. [3], while those of RbCl, RbBr, RbI, and CsF are from Ref. [4].

[b] Values are from Handbook of Chemistry and Physics, Ref. [5].

[c] Values are from JANAF Thermochemical Tables, Ref. [6].

[d] Values are obtained from Ref. [2, 7].

[e] Values are obtained from Handbook of Military Infrared Technology, Ref. [8].

the present work was initiated. Inherent in the character of this work is the fact that we have drawn most heavily upon the scientific literature and feel a debt of gratitude to the authors whose results have been used.

Although all of the alkali halides are, in principle, good optical materials, some of them, however, are intrinsically unsuitable for ordinary applications. They are either physically inadequate or chemically unstable. As a result, available data on the optical constants are concentrate to the following seven materials: LiF, NaF, NaCl, KCl, KBr, KI, and CsI, which are being presented in this work.

Results of the present work are given in two separate reports, Part I and Part II. The first report constitutes essentially the reporting of current status of available data. Material is comprehensively compiled and displayed so that one can see at a glance the spectral distribution of available data and the variation of data with respect to temperature and frequency. In addition, efforts are made to generate recommended values of absorption coefficient for the laser wavelengths and the multiphonon region. The result is an expression that relates the molecular weight of the crystal and a key parameter in an equation that predicts the intrinsic absorption coefficient. Details of this finding is discussed in the section of the report entitled "Summary of Results and Recommendations." In the second report, which will be submitted later, efforts on data analysis and theoretical studies are discussed. It has been experimentally observed in alkali halide crystals, that the exponential dependence of absorption coefficient on frequency holds in the multiphonon region as well as in the Urbach tail region. Furthermore, a power law seems to be generally valid in relating the absorption coefficient with temperature in the temperature region >200 K. All of these features are clearly displayed in the first report. It can be seen that analytical expressions similar to those for the Urbach tail can be formulated for the multiphonon region.

2. BACKGROUND ON THEORETICAL CONSIDERATIONS AND METHODS OF MEASUREMENT

The study of the propagation of light through matter, particularly solids, comprises one of the important and interesting branches of optics. The many and varied optical phenomena exhibited by solids include selective absorption, dispersion, double refraction, polarization effects, and electro-optical and magneto-optical effects. Many of the optical properties of solids can be understood on the basis of classical electromagnetic theory.

The macroscopic electromagnetic state of solids, at a given site, is described by four quantities:

(i) The volume density of electric charge
(ii) The volume density of electric dipoles, called the polarization
(iii) The volume density of magnetic dipoles, called the magnetization
(iv) The electric current per unit area, called the current density

All of these quantities are considered to be macroscopically averaged in order to smooth out the microscopic variations due to the atomic makeup of matter. They are related to the macroscopically averaged electric and magnetic fields by the well known Maxwell equations [9].

Detailed discussion of Maxwell's equations is beyond the intended scope of the present work. What we should bear in mind is that the general solution of Maxwell's equations is a wave function for electric or magnetic field. In the treatment of the interaction of light and matter, the light is considered as an oscillating electric field that engulfs the constituent molecules of matter. Each of the molecules may be considered to be a charged simple harmonic oscillator. When these constituent oscillators are driven by the engulfing electric field of light they become excited by that field and emit Huygens-like spherical wavelets. In the early development of the theory of propagation of light in matter, there was no practical alternative to treating the matter as a collection of charged harmonic oscillators subject, perhaps, to damping forces. The modern developments in the theory of matter and its interaction with radiation, have shown that this simple model has broad utility, and that it can be employed in the discussion of optical constants.

The theory of the optical properties of single crystals is well known and has been extensively reviewed. Hence, in this section, rather than discuss the derivation of the theory in detail, we will instead simply define

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theoretical constants, their inter-relationship, and how they appear in expressions for experimentally measurable quantities such as transmission, reflectivity, refractive index, and absorption coefficient.

The response of a nonmagnetic solid with isotropic or cubic symmetry to incident electromagnetic radiation can be generally described in terms of two optical constants, which are related to each other through dispersion relations. These two optical constants can consist of either the refractive index n and the extinction coefficient κ, or ε_1 and ε_2, which are respectively the real and imaginary part of the complex dielectric constant ε. These two pairs of constants are related as follows:

$$\varepsilon = \varepsilon_1 + i\varepsilon_2 + (n + i\kappa)^2 = (n^2 - \kappa^2) + 2in\kappa \tag{1}$$

Let R_∞ be the reflectivity at normal incidence of a solid of sufficient thickness so that there is negligible reflection from the rear surface of the solid and τ_∞ be the corresponding transmission at normal incidence, then R_∞ can be expressed in terms of n and κ as follows:

$$R_\infty = \frac{(n - n')^2 + \kappa^2}{(n + n')^2 + \kappa^2} \tag{2}$$

Generally, the solid is either in air or in a vacuum, where $n' \doteq 1$. Therefore, Eq. (2) becomes

$$R_\infty = \frac{(n - 1)^2 + \kappa^2}{(n + 1)^2 + \kappa^2} \tag{3}$$

Similarly, τ_∞ can be expressed as

$$\tau_\infty = \{(1 - R_\infty)^2 + 4R_\infty \sin^2 \Psi\} \, e^{-\alpha t} \tag{4}$$

where

α = absorption coefficient = $4\pi\kappa/\lambda$

λ = wavelength of incident radiation

t = thickness of the sample

$\Psi = \tan^{-1} [2\kappa/(n^2 + \kappa^2 - 1)]$

If n >> κ, Eq. (4) becomes

$$\tau_\infty \doteq (1 - R_\infty)^2 \, e^{-\alpha t} \tag{5}$$

Equation (5) is commonly used to determine the absorption coefficient directly by observing the decay of incident light with the thickness of sample.

As we mentioned earlier, the above equations are valid only if the reflection from the rear surface of the solid is negligible. For thin samples, where the reflection from the rear surface cannot be neglected, then the expressions for apparent reflectivity and transmission are:

$$R = \frac{R_\infty \left[(1 - e^{-\alpha t})^2 + 4e^{-\alpha t} \sin^2 \gamma\right]}{(1 - R_\infty e^{-\alpha t})^2 + 4R_\infty e^{-\alpha t} \sin^2 (\Psi + \gamma)} \tag{6}$$

$$\tau = \frac{e^{-\alpha t} \left[(1 - R_\infty)^2 + 4R_\infty \sin^2 \Psi\right]}{(1 - R_\infty e^{-\alpha t})^2 + 4R_\infty e^{-\alpha t} \sin^2 (\Psi + \gamma)} \tag{7}$$

where

$\gamma = \frac{2\pi nt}{\lambda}$ (n is an integer),

t = thickness of a thin sample,

R = apparent reflectivity,

τ = apparent transmission.

The second term in the denominator in Eqs. (6) and (7) is an interference term. If no interference fringes are observed because of thickness variation, we then average over γ and obtain:

$$R = \frac{R_\infty (1 - e^{-2\alpha t})}{1 - R_\infty^2 e^{-2\alpha t}} \tag{8}$$

$$\tau = \frac{\left[(1 - R_\infty)^2 + 4R_\infty \sin^2 \Psi\right) e^{-\alpha t}}{1 - R_\infty^2 e^{-2\alpha t}} \tag{9}$$

It appears that if we know R_∞ and either n or κ, the remaining one can be calculated from this relation. But this usage is only limited to the transparent region where direct measurement of n can be made. It is obvious that the key roles in this method rest on τ and R which are usually difficult to measure accurately because of influencing surface conditions, such as flatness, aging, oxide layers, adsorbed gas, etc. Errors of 1 to 5% in the resulting absorption coefficient are typical. However, this method is self-contained at a given wavelength, and it does not require additional data at other wavelengths or other properties.

Beyond the transparent region, in the high absorption regions, where neither n nor κ are observable, one has to rely on the reflection spectrum from which the optical constants can be derived by the Kramers-Kronig analysis or by the multiple-oscillator fit based on the Lorentz theory [10].

The Kramers-Kronig relations are derived from the dispersion relation in that the phase angle $\theta(\omega)$ of the complex reflectivity, $\bar{R}(\omega)$, is evaluated based on the observed reflection spectrum

$$\bar{R}(\omega) = R(\omega)e^{i\theta(\omega)} \tag{10}$$

$$\theta(\omega) = \frac{\omega}{\pi} P \int_0^\infty \frac{[\ell nR(\omega') - \ell nR(\omega)]}{\omega^2 - \omega'^2} d\omega' \tag{11}$$

where ω is the frequency of radiation and P is the principal value of the Cauchy integral. Based on the amplitude $R(\omega)$, and phase angle of the reflectivity, the refractive index and absorption index can be calculated according to the following equations:

$$n(\omega) = \frac{1 - R(\omega)}{1 + R(\omega) - 2\sqrt{R(\omega)}\cos\theta(\omega)} \tag{12}$$

and

$$\kappa(\omega) = \frac{2\sqrt{R(\omega)}\ \sin\theta(\omega)}{1 + R(\omega) - 2\sqrt{R(\omega)}\cos\theta(\omega)} \tag{13}$$

In principle, the calculation of θ requires a complete reflection spectrum with frequency ranging from zero to infinity. In practice, however, since R is measured only in a limited range of frequencies, errors are inevitable in the calculation of θ and hence in n and κ. These errors arise from the extrapolation of $R(\omega)$ beyond the range of measurements. The typical errors in the resulting n and κ are 5 to 10%, or more.

In the Lorentz theory, the refractive index and absorption index are related to the oscillator frequencies, ω_i, the oscillator strengths, S_i, and the damping factors, γ_i, by the expressions

$$n^2 - \kappa^2 = \varepsilon_\infty + \sum_i \frac{S_i\ [1 - (\omega/\omega_i)^2]}{[1 - (\omega/\omega_i)^2]^2 + \gamma_i^2\ (\omega/\omega_i)^2} \tag{14}$$

$$2n\kappa = \sum_i \frac{S_i\gamma_i\ (\omega/\omega_i)}{[1 - (\omega/\omega_i)^2]^2 + \gamma_i^2\ (\omega/\omega_i)^2} \tag{15}$$

where ϵ_∞ is the optical dielectric constant. The resulting n and κ have to satisfy the observed reflectivity by the relation

$$R(\omega) = \left| \frac{n(\omega) - 1 + i\kappa(\omega)}{n(\omega) + 1 + i\kappa(\omega)} \right|^2 \tag{16}$$

It is clear that this approach requires the knowledge of the oscillator frequencies which in general is not complete because of experimental difficulties. This leaves us no choice but to use only the observed predominant ones. Nevertheless, this method, similar to the Kramers-Kronig analysis, yields good approximations to the properties under consideration.

Precise determination for small absorption coefficients, in the order of 10^{-3} cm^{-1} or lower, was considered impossible until the laser source became available. As the bulk absorption becomes smaller than surface losses, uncovering the former requires amplification of the absorption effect which in turn requires high-level energy input to the sample. The two commonly used methods are laser calorimetry [11] and the differential technique [12].

In the laser calorimetric method, the absorbed energy is measured in the form of heat. It can be shown that the total absorption is related to the absorbed energy, E_a, by

$$\alpha L + 2\sigma = \frac{E_a}{E_T}\left(\frac{2n}{1+n^2}\right) \tag{17}$$

provided $\alpha L < 1$. Here, L is the sample length through which a laser beam passes and σ is the loss per unit surface area. E_a can be calculated using the specific heat and mass of the sample and the measured temperature rise. The transmitted energy can be determined using a black body and its temperature rise. In order to separate the bulk and surface absorptions, the total absorption of a series of samples of different thickness, cut from the same piece of material and polished in the same way must be measured. A plot of total absorption versus sample thickness will give a straight line with slope α and intercept 2σ. This method yields very accurate results and is used to measure absorption as low as 10^{-5} cm^{-1}.

In the differential technique, a dual-beam spectrometer is the basic apparatus and the transmissions and thicknesses of a thick sample (τ_s and d_s) and a reference sample (τ_r and d_r) are measured. An optical wedge is added to the reference beam and its transverse position is so adjusted as to balance the transmitted intensity of the sample beam. The transmission of the wedge, τ_w, is then measured. The relation of the three measured transmissions is, therefore

$$\tau_r \times \tau_w = \tau_s \tag{18}$$

hence, by using Eq. (9)

$$\tau_w = e^{-\alpha\Delta d} \left(\frac{1 - R^2 e^{-2\alpha d_r}}{1 - R^2 e^{-2\alpha d_s}} \right) \tag{19}$$

where $\Delta d = d_s - d_r$, and

$$R = \left(\frac{n-1}{n+1} \right)^2 \tag{20}$$

The accuracy of this method depends on the accuracies of the refractive index and transmission, respectively. While the former can be determined with high accuracy, accuracies of the latter depend on the instrument utilized. An uncertainty of ±1% or greater is in general expected. This imposes a limit, on the order of 1×10^{-3} cm^{-1}, to the lowest absorption coefficient that can be measured by this method.

The typical absorption spectrum of an alkali halide is shown in Figure 1. If we plot the absorption coefficients versus frequency on a semi-log scale, we obtain the absorption spectrum as shown in Figure 2. Behavior of the absorption coefficients in the multiphonon and Urbach regions, respectively, suggests an exponential relation between absorption coefficient and frequency, i.e., $\alpha = \alpha_0 e^{cv}$, where α_0 and c are constants. In the transparent region, absorption coefficients of a pure crystal are usually low. If reflectivity can be accurately measured, absorption coefficient can be determined using Eq. (3).

It should be noted that Eq. (3) does not apply to crystals with impurities and defects which are characterized by the emergence, in the transparent region, of a number of absorption bands, the so-called "color centers." The

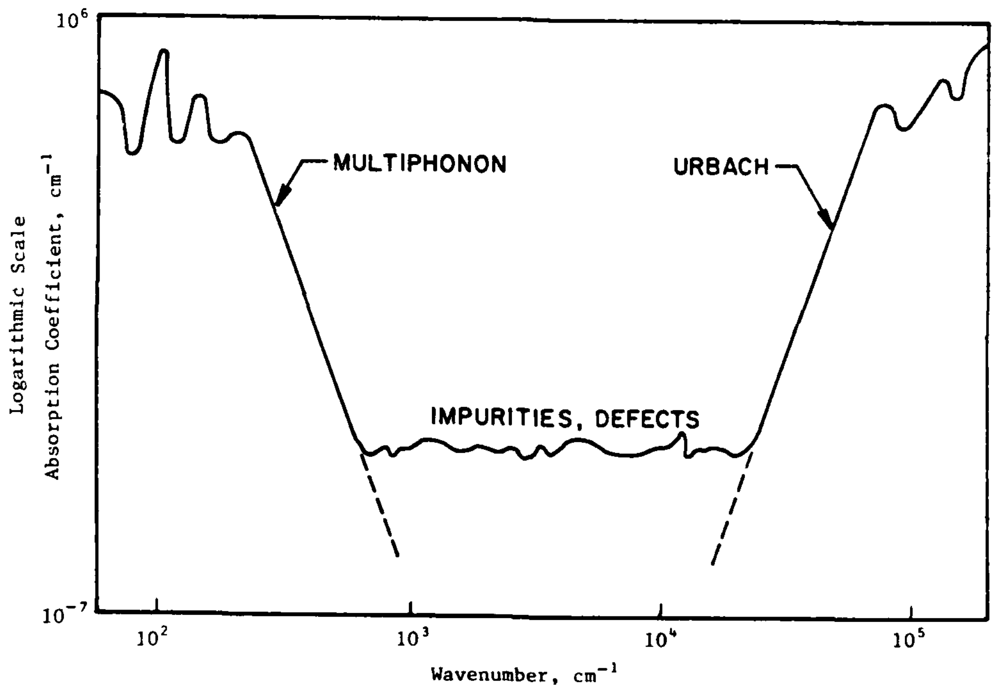

Figure 2. Schematic Absorption Spectrum of an Alkali Halide in Semilogarithismic Scale

well known ones are the F, R, M, and N absorption bands. Absorption coefficients at these bands vary considerably with temperature, radiation, and time. However, at wavelengths other than these bands, differences in n are negligibly small between samples, and Eq. (3) is valid. The importance of n in relating other optical quantities is self-revealed. Essential parameters for formulae of refractive indices of pure crystals are given in Table 2.

TABLE 2. AVAILABLE PARAMETERS FOR DISPERSION EQUATIONS OF ALKALI HALIDES AT ROOM TEMPERATURE

Material	ϵ_0 [a]	ϵ_∞ [b]	Ultraviolet Absorption Peaks[c] (μm) λ_i	Infrared Absorption Peaks: Wavelength λ_i (μm)	Infrared Absorption Peaks: Oscillator Strength ϵ_i	Infrared Absorption Peaks: Damping Factor γ_i (μm)
LiF	9.01	1.93		32.79, 19.86	6.80, 0.11	1.967, 3.578
LiCl	11.86	2.75	0.130, 0.143	49.26		
LiBr	13.23	3.16	0.156, 0.162, 0.173	57.80		
LiI	11.03	3.80	0.120, 0.140, 0.167, 0.176, 0.183, 0.197, 0.212	70.42		
NaF	5.072	1.174	0.117	36.57		
NaCl	5.90	2.33	0.050 0.100 0.128 0.158	60.98, 40.50, 120.34	3.2001, 0.0500, 0.231	2.281, 5.770, 105.39
NaBr	6.396	2.60	0.125, 0.145, 0.176, 0.188	74.63		
NaI	7.28	3.01	0.122, 0.141, 0.170, 0.187, 0.228	86.21		
KF	5.50	1.85	0.126	51.55		
KCl	4.55	2.17	0.131, 0.162	70.42		
KBr	4.90	2.36	0.146, 0.173, 0.187	87.72, 60.61	2.4661, 0.1555	4.561, 13.910
KI	5.09	2.65	0.129, 0.175, 0.187, 0.219	98.01, 69.44	2.1363, 0.2765	8.235, 20.832
RbF	6.48	1.93	0.115, 0.132	63.29		
RbCl	4.92	2.18	0.128, 0.166	85.81		
RbBr	4.86	2.34	0.123, 0.146, 0.155, 0.178, 0.191	114.29		
RbI	4.94	2.58	0.120, 0.131, 0.156, 0.179, 0.187, 0.223	132.45		
CsF	8.08	2.16	0.110, 0.118, 0.136	78.74		
CsCl	6.95	2.63	0.119, 0.137, 0.145, 0.162	100.50, 80.00	4.0212, 0.2513	7.538, 26.600
CsBr	6.38	2.78	0.130, 0.146, 0.160, 0.173, 0.187	126.05, 97.09	3.5688, 0.1131	8.163, 15.531
CsI	6.31	3.02	0.130, 0.147, 0.163, 0.177, 0.185, 0.206, 0.218	161.29, 117.65	3.2673, 0.0628	11.290, 17.648

[a] Static dielectric constant data are from Ref. [13, 14, 15, 16, 17].

[b] High-frequency dielectric constant data are from Ref. [13, 16, 18].

[c] The ultraviolet absorption peaks are measured by Hilsch and Pohl [19] Schneider and O'Bryan [20] and Ramachandran [21].

[d] The order of ϵ_i's and γ_i's corresponds to the order of the λ_i's. Data sources: see Ref. [13, 16]; for LiF see Ref. [22]; for NaCl see Ref. [23]; for KBr see Ref. [24] for KI see Ref. [25], for CsCl, CsBr, and CsI see Ref. [26].

3. NUMERICAL DATA

Presentation of Data

Data in the open literature are reported in various units. Absorptions are given in units of cm^{-1}, or as extinction index, optical density, or normalized values. Energy is presented in terms of wavelength, wavenumber, frequency, or electron volt. In the present work, the absorption coefficient is consistently reported in units of cm^{-1} and the energy in units of wavenumber, cm^{-1}. All of absorption data were converted, when necessary, to these uniform set of units. However, in the case of reflectivity and transmission data, the energy unit is in wavelength, μm, as conventionally accepted. Although we have surveyed the absorption coefficient in the vacuum ultraviolet (vuv) region and a number of data sets have been collected, no attempt was made to analyze the spectrum in the vuv region as it is beyond the scope of this work. However, it was felt desirable to see the complete spectrum of absorption coefficient. For this reason the vuv absorption spectra are given in the Appendix.

A number of figures and tables summarize the information and data. The conventions used in this presentation, and specific comments on the interpretation and use of data are given below. Each sub-section in this section gives all the information and data for a given material. The sub-sections are arranged in the following order:

3.1 Lithium Fluoride, LiF
3.2 Sodium Fluoride, NaF
3.3 Sodium Chloride, NaCl
3.4 Potassium Chloride, KCl
3.5 Potassium Bromide, KBr
3.6 Potassium Iodide, KI
3.7 Cesium Iodide, CsI

Presented in each sub-section are information and data in the following order:

a. A text describing and discussing the data, analysis, and recommendations. With the thought that in general a reader will only concern himself with a specific substance, it was felt highly desirable to include in each sub-section important information even if it should constitute a repetition of some of the subject matter found in other sections or sub-sections.

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b. A figure of experimental absorption coefficient (wavenumber dependence). For the purpose of showing the details in each of the multiphonon and Urbach tail regions, additional figures are included for visual clarity.

c. A summary table of measurements on the absorption coefficient (wavenumber dependence). An extract of pertinent information for each data set is given in this table.

d. A table of experimental data on the absorption coefficient (wavenumber dependence). The original data reported in this table are converted to the adopted set of units. The order of magnitude of absorption coefficient varies over a wide range, from 10^{-6} cm^{-1} to 10^{6} cm^{-1}, and that of wavenumber varies from 10 cm^{-1} to 10^{5} cm^{-1}. Therefore, it is convenient to present the data in powers of ten. In this table, the numerical value 1.259E±n stands for $1.259 \cdot 10^{\pm n}$.

e. A figure of experimental absorption coefficients (temperature dependence).

f. A summary table of measurements on the absorption coefficient (temperature dependence).

g. A table of experimental data on the absorption coefficient (temperature dependence).

h. A figure of experimental reflectivity.

i. A summary table of measurements on the reflectivity

j. A table of experimental data on the reflectivity.

k. A figure of experimental transmission.

l. A summary table of measurements on the transmission.

m. A table of experimental data on the transmission.

n. A table of peak positions and the corresponding half-widths of the well known F, R, M, and N absorption bands.

o. A table of recommended values on the absorption coefficient in the infrared wavelength region. It is rather difficult to give recommendations in this region since most of the data are still in a provisional status, as evidenced by new claims of the discovery of lower values obtained through improvements in sample preparation and experimental

techniques. As a result, in our tables of recommended values, we give the lower limits predicted by the theoretical relations, the lowest available values, or the most probable range of values for a randomly selected sample.

In figures containing experimental data, if data sets are distinguishable, the data sets are labeled by appropriate legends and denoted by the numbers corresponding to those assigned in the corresponding tables on the summary of measurements and experimental data. The tables on the summary of measurements give for each set of data the following information: the reference number, author's name (or names), year of publication, wavelength range covered by the data, temperature range, the description and characterization of the specimen, and information on measurement conditions contained in the original paper.

There are a number of experimental methods used for absorption coefficient determinations. Listed below are the four most commonly used ones and their corresponding code symbols used in the tables:

C - calorimetric method

Z - transmission and refraction method

T - transmission method

R - reflection method

The methods listed above are arranged in the order of their inherent accuracies. The calorimetric method is by far the most accurate method in the determination of the absorption coefficient. It is used for measuring very low absorptions with the lowest attainable level, in the order of 10^{-5} cm^{-1}. Absorption coefficients determined by the second method are usually reliable if the multiple internal reflection and transmission are accounted for. The transmission method is the most popular one used for absorption measurements because of its simplicity. The reflection method is the least accurate method, since errors of 5 to 10% or more are typical. It should be noted that neither the second nor the third method is suitable for absorption coefficient lower than 0.001 cm^{-1} as their sensitivities are considerably reduced at low absorption levels.

Wavelength and wavenumber are two equivalent units to describe the spectral dependence of a property. The conversion table given below should prove convenient.

WAVENUMBER VS WAVELENGTH EQUIVALENTS

Wavenumber, cm^{-1}	Wavelength, μm
100,000	0.1
10,000	1.0
9,434	1.06
5,000	2.0
3,571.4	2.8
3,333.3	3.0
2,631.6	3.8
2,500	4.0
2,000	5.0
1,886.8	5.3
1,666.7	6.0
1,428.6	7.0
1,250	8.0
1,111.1	9.0
1,052.6	9.5
1,000	10.0
943.4	10.6
909.1	11.0

3.1. Lithium Fluoride, LiF

Lithium fluoride has long been of practical interest to spectroscopy because of its attractive optical properties. Its large electronic band gap places its useful transmission limit near 0.11 μm, further into the vacuum ultraviolet region than any other known material. It is, therefore, a useful substrate for absorption studies on thin films of other materials and has long been used as such. In the range of 0.25-4.5 μm the dispersion is low and transmission is high. Less transmission and higher dispersion are found in the low ultraviolet and the infrared. In the low ultraviolet, optical components must be made very thin in order to obtain maximum transmission. Selected specimens of lithium fluoride, in moderately thin pieces, may be expected to transmit several percent of the light down to wavelengths as short as 0.11 μm. Impurities in the crystal, poor polish, and layers of foreign material on the surface may reduce the transmission in the Schumann region down to a negligible quantity. In the infrared, transmission begins to fall off rapidly at 7 μm, and a prism is useful to 5 μm.

Optically speaking, lithium fluoride closely resembles calcium fluoride. However, lithium fluoride is preferable to calcium fluoride for use in prismatic form because of its much greater dispersion in the infrared and greater transparency in the extreme ultraviolet.

Unlike the other alkali halides, lithium fluoride is practically insoluble, and advantage is taken of this fact in the purification of the salt. High purity single crystals of lithium fluoride up to more than 5 inches in diameter and 4 kg in weight are commercially available and are suitable for making optical components in various sizes.

Measurements of the refractive index of lithium fluoride date back to 1927. The existing data cover a spectral range from 0.00236 to 600 μm and at 2000 μm. Based on the optical behavior of the material and the experimental techniques, these data fall quite naturally into two categories: the transparent region ($\sim$0.11 to $\sim$9.0 μm) and the absorption regions ($\lesssim$0.11 and $\gtrsim$9.0 μm). For the high transparency region, since large sizes of LiF are easily obtained, the deviation method is commonly used with the sample in prismatic form. This method was adopted by a number of researchers: Gyulai [27], Schneider [28],

Hohls [29], Harting [30], Durie [31], and Tilton and Plyler [32]. The deviation method, though the oldest, is often considered as the most accurate; less accurate data can be obtained by the interference method. Due to the high absorption in the low uv and near IR at the end of transparent region, the deviation method and interferometry cannot be used. Refractive indices are obtained either by measuring transmission of thin films or by theoretical analysis of the reflection spectra from the bulk material.

Li [33] reduced the experimentally measured data then available to a common temperature of 293 K and after careful analysis generated a Sellmeier type formula representing the refractive index of LiF at 293 K in the spectral region from 0.10 to 11.0 μm,

$$n = 1 + \frac{0.92549\ \lambda^2}{\lambda^2 - (0.07376)^2} + \frac{6.96747\ \lambda^2}{\lambda^2 - (32.79)^2} \tag{21}$$

where λ is in units of μm.

Investigations of absorption coefficient for practical applications are generally classified into three wavelength regions: the ultraviolet and the infrared limits of transparent regions, and the transparent regions. In the ultraviolet limit, the motivation of the researches was to investigate the exciton states in the crystal and to determine the Urbach-rule parameters at the absorption edge.

Kato [34] determined absorption coefficients in the wavelength range from 0.09 to 0.19 μm by applying the Kramers-Kronig relation to the observed reflection spectra of bulk crystal. The peak position of the fundamental band was determined to be at 0.0976 ± 0.0008 μm where the corresponding absorption coefficient was found to be $2.2 \pm 0.1 \times 10^6\ cm^{-1}$. In the investigation of the effects of hydrolysis on the absorption coefficient, crystals grown in air were studied. It was found that absorption near 2.8 μm was due to the vibration of O-H bond and in addition it gave a broader absorption at the tail of the fundamental band. Roessler and Walker [35] reported absorption index in the wavelength region from 0.0443 to 0.248 μm. The absorption coefficient was derived from the near normal reflection spectra of freshly cleaved crystal by Kramers-Kronig analysis. Since any defects or surface contamination tend to decrease the sharpness of uv reflectance structure, the reflection spectra from surfaces showing highest reflectance at structure peaks were selected for their analysis to assure minimum surface contamination and defects.

Schneider [28] determined absorption coefficient (in the wavelength region from 0.11 to 0.16 μm) directly through measurements of transmissions of plate specimens of various thickness. The crystals used are believed to be of high purity and quality polished, as evidenced by higher transmission at short wavelength, 0.11 μm. It was noted that the main factor of decreased transmission was due to the deposits as a result of chemical reaction of the surface with moisture.

Görlich et al. [36] investigated crystals grown by both of the Bridgman and Kyropoulos methods. Absorption spectra in the wavelength range from 0.20 to 0.79 μm were measured for both crystals. Although impurity contents and concentrations had no spectroscopically detectable difference, the crystal grown in air showed much higher absorption coefficients in the region 0.2 to 0.4 μm than that grown in vacuum, particularly steeply rising toward 0.2 μm. In addition, absorption bands in the range between 2.6 to 2.8 μm were observed in air grown crystals but not in vacuum grown ones. This observation is consistent with the results of Kato [34], the extinction of crystals grown in air is chiefly composed of the scattering of light by the microscopic irregularities of the crystalline structure and of the absorption of the additionally incorporated OH^- or oxygen ions. Gyulai [27] reported absorption coefficients in the region between 0.18 and 0.40 μm for a crystal grown by the Kyropoulos method. Owing to the differences in impurity contents and defects, the absorption spectrum showed different profile from that of Görlich et al. [36]. However, both reported weak selective absorption bands between 0.25 and 0.30 μm where the F center is located. Tomiki and Miyata [37] measured absorption coefficients in the Urbach tail region at four temperatures, from 300 to 573 K. They found the tail at 300 K was extrinsic. Based on the data at three higher temperatures, it was possible to find the following parameters:

$E_o = 13.00$ eV,
$\alpha_o = 1.0 \times 10^{10}$ cm^{-1},
$hf = 0.23$ meV,

and

$\sigma_{so} = 0.70$,

for the equations representing the intrinsic absorption in the tail region:

$$\alpha(E,T) = \alpha_o e^{-\sigma_s(T)(E_o-E)/kT} \tag{22}$$

and

$$\sigma_s = \sigma_{so} \frac{2kT}{hf} \tanh \frac{hf}{2kT}$$

Measurements of absorption coefficient for the infrared region were made for the purpose of studying the optically active lattice vibrations and fundamental resonant frequencies. On the short wavelength side of the fundamental absorption band, multiphonon absorption, in which a photon is absorbed and two or more phonons are generated, can occur and lead to absorption coefficients that range from 10^{-3} cm^{-1} to 10^{2} cm^{-1}, depending on the number of phonons generated.

Jasperse et al. [22] made self-consistent measurements of the infrared reflectivity for a wide temperature range from 7.5 to 1060 K. The absorption index was computed by using a two-resonance damped oscillator model. Through the classical pole-fit procedures, by assuming the optical dielectric constant to be temperature independent, they were able to establish the temperature dependence of the resonant frequencies, the damping factors, and the oscillator strengths.

Barker [38] studied the multiphonon infrared absorption by samples of crystalline and molten LiF at temperatures between 300 and 1160 K (melting temperature 1115 K). It was found that the absorption behavior of the molten salt could be closely predicted from the absorption behavior of the solid as if there was no phase transition occurring. The observed relatively small change during the phase transition from solid to liquid implies that at least the high frequency limit of the vibrational spectra are approximately the same in the solid and liquid phases close to the melting point. However, at temperatures from 10-30 K higher than the melting point, the absorption coefficient decreased noticeably and the static dielectric constant changed from 10.76 to 7.84 [39].

Kachare et al. [40] determined the absorption coefficient by a Kramers-Kronig analysis of the reflection spectra. The reflection spectra were measured accurately, particularly in the difficult minimum reflection region. It was concluded that the classic dispersion analysis could not provide reliable values of optical constants for highly anharmonic crystals while the KK analysis could, but required reliable reflectivity data.

Deutsch [12], using a differential technique with a dual beam spectrometer, measured the absorption coefficient for the wavelength range from 4.3 to 7.0 μm at room temperature. It was found that these data could be represented by an exponential relation as:

$$\alpha = \alpha_o \exp(-\nu/\nu_o) \tag{23}$$

where α_o = 21,317 cm^{-1} and ν_o = 153.2 cm^{-1}, according to Deutsch. Klier [41] reported the absorption index in the wavelength range between 5.4 and 14.7 μm. Hohl [29] also reported the absorption index in the range between 4.5 and 15.7 μm. Hohl's values agreed with Klier's in general except that Hohl's measurements showed distinct structure features in the wavelength region beyond 13 μm. In the region from 5 to 11 μm the results of Hohl and Klier agree well with Deutsch's exponential relation, Eq. (23).

Owens [42] measured absorption coefficient at three wavelengths in the millimeter-wave region. Combined with the measurements of other investigations, Owens observed that the extinction coefficient decreased with increasing wavelength and approached a constant value of about 1×10^{-4} below 1 GHz. The origin of this constant background loss, which appeared to be independent of temperature, is unknown. It may be due to imperfections in the crystal. Stolen and Dransfeld [43] measured absorption at a wavelength 320 μm between 200 and 425 K. It was found that the absorption increases as a quadratic function of temperature.

Figures 3 to 6 are plots of the available data. The pertinent information of each data source and the corresponding original values are given in Tables 3 to 6. In addition, available information and data on the reflectivity and transmission are also presented in a similar manner (in Figures 7 and 8 and Tables 7 to 10) for completeness and comparison. For the visible and near visible regions, Table 11 gives the spectral positions of the well-known color centers. Noticeable absorptions are likely to occur at these centers when the crystal is exposed to ultraviolet or x-ray radiation.

Recommended values given in Table 12 were calculated according to Eq. (23). In the range between 4.37 and 7 μm, these values are supported by the measurements of Deutsch. It appears that LiF has a high intrinsic absorption coefficient in this region. However, if Eq. (23) holds in the range below 3.9 μm, we can see the intrinsic absorption coefficients in this region are lower than

10^{-4} cm^{-1}. There is an absorption band in the range between 2.6 to 2.8 μm which owes its origin to the inclusion of hydroxyl ions. This absorption band is diminished in vacuum grown crystals. It should be noted that the values in the column "intrinsic" are the lowest limits that one can obtain for ideal samples. In practice, the observed values are generally higher than the limiting values. Unless values appear in the column "observed," the limiting values should be considered as guidelines for estimation and investigation.

Although it was not the aim of this investigation to compile and evaluate the absorption data in the vacuum ultraviolet region, this was done to provide the users a total picture of the available absorption data. The plot of selected curves in this region is given in the Appendix of this report.

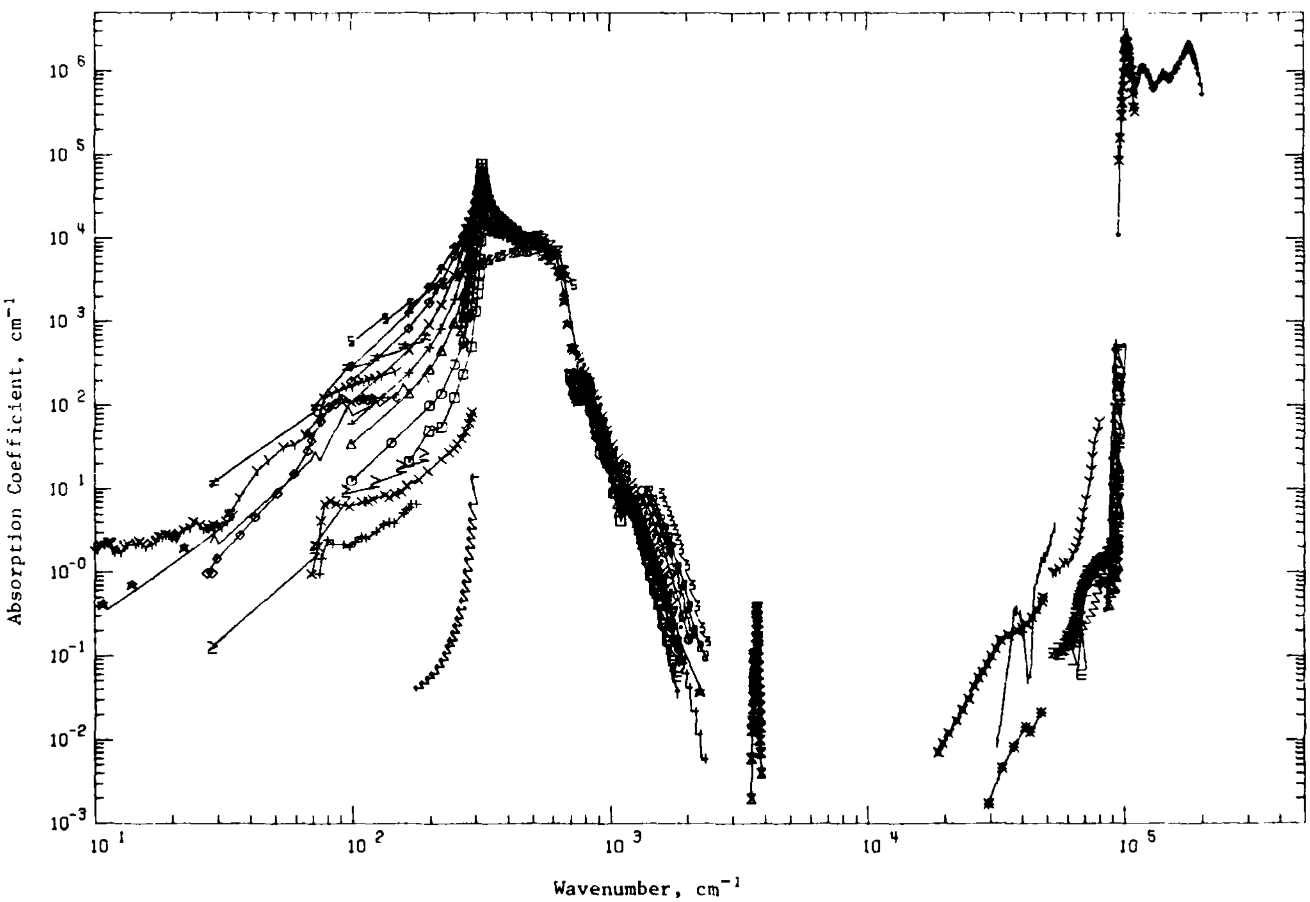

Figure 3. Absorption Coefficient of Lithium Fluoride (Wavenumber Dependence)

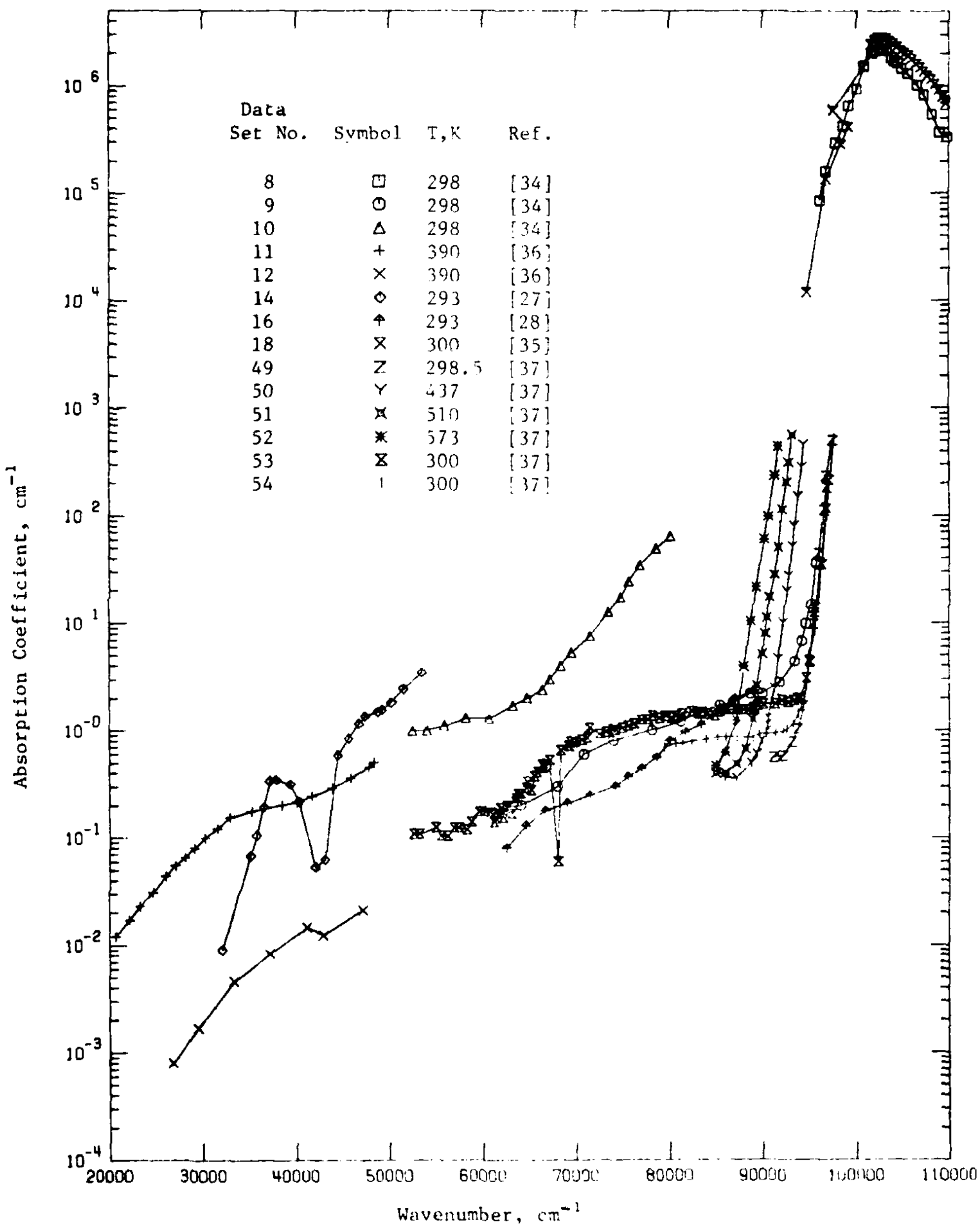

Figure 4. Absorption Coefficient of Lithium Fluoride in the Urbach Tail Region

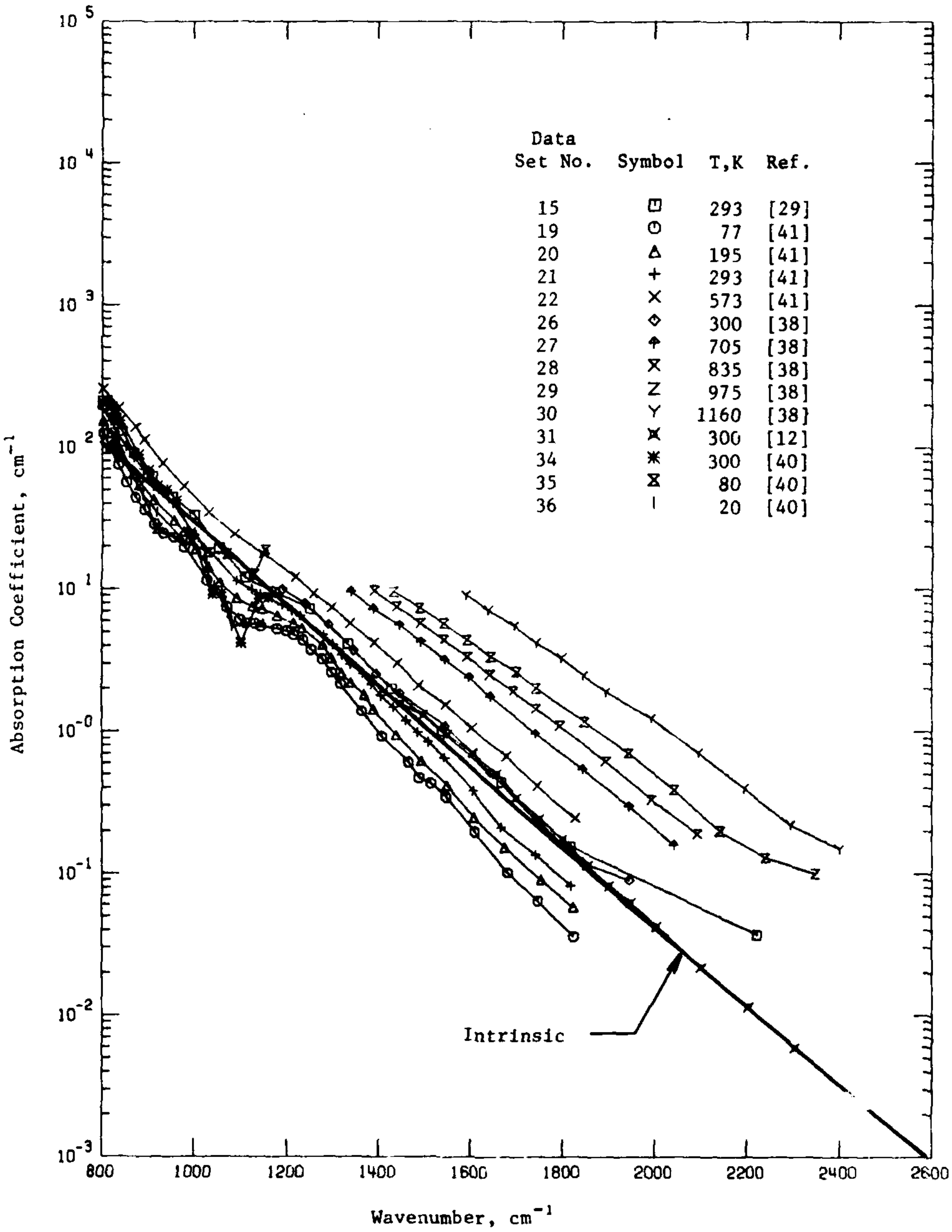

Figure 5. Absorption Coefficient of Lithium Fluoride in the Multiphonon Region

TABLE 3. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	22	Jasperse, J.R., Kahan, A., Plendl, J.N., and Mitras, S.	1966	R	100-588	7.5	High purity; single crystal; hand polished until optically flat to about 1/2 wavelength of the mean sodium D lines; annealed in a vacuum furnace for two days at a temperature of about 3/4 of the melting temperature of the crystal; near normal (averaged about 11 degrees) reflectivities in the spectral range from 12.5 to 50 μm determined by comparing spectral reflectances from the sample and from an aluminized mirror with reflectivity in the spectral region under consideration; reflectivity data were checked several times for different samples and for several cycles of heating and cooling and reproduced to within ±1 to ±2%; the reflection spectra were analyzed by means of a two-resonant damped-oscillater model; absorption coefficients were calculated from the resulting equations.
2	22	Jasperse, J.R., et al.	1966	R	100-588	85	Same as above.
3	22	Jasperse, J.R., et al.	1966	R	100-588	295	Same as above.
4	22	Jasperse, J.R., et al.	1966	R	100-588	420	Same as above.
5	22	Jasperse, J.R., et al.	1966	R	100-588	605	Same as above.
6	22	Jasperse, J.R., et al.	1966	R	100-588	840	Same as above.
7	22	Jasperse, J.R., et al.	1966	R	100-588	1060	Same as above.
8	34	Kato, R.	1961	R	9.6×10^4-1.1×10^5	298	High purity; single crystal; freshly cleaved specimens; near normal (15 degrees incident angle) reflectivity obtained; Kramers-Kronig relations applied to derive the optical constants n and κ from the reflectivity; data extracted from a figure.
9	34	Kato, R.	1961	R	6.4×10^4-9.6×10^4	298	Same as above but only for details at the tail of fundamental band; absorption-coefficient data extracted from a figure.
10	34	Kato, R.	1961	R	5.2×10^4-8.0×10^4	298	Similar to above; absorption-coefficient data extracted from a figure.
11	36	Görlich, P., Karras, H., and Kötitz, G.	1963	T	1.89×10^4-4.84×10^4	390	Single crystal; grown by the Kyropoulos (in air) method; impurities of Al, Ca, Cr, Cu, Na, Mg, Mn, Si, and Fe [illegible] concentrations estimated to be between 10^{-4}-10^{-2}%; unspecified specimen configurations; absorption spectrum obtained and absorption coefficients determined; absorption coefficient data extracted from a figure.
12	36	Görlich, P., et al.	1963	T	2.68×10^4-4.72×10^4	390	Similar to above except for crystal grown by the Bridgman (in vacuum) method.

TABLE 3. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
13	36	Görlich, P., Karras, H., and Kötitz, G.	1963	T	$3.54\times10^{3}-3.87\times10^{3}$	300	Similar to above for crystal grown by the Kyropoulos (in air) method and measured for infrared region where the crystal grown by the Bridgman (in vacuum) showing no absorption.
14	27	Gyulai, Z.	1927	T	$3.2\times10^{4}-5.4\times10^{4}$	293	Single crystal; grown by the Kyropoulos method; plate specimen of 1.4 mm thick; absorption coefficient determined by Smakula for the author; data extracted from a figure; temperature not specified, 293 K assumed.
15	29	Hohls, H.W.	1936	T	$6.34\times10^{2}-2.23\times10^{3}$	293	Crystal; grown by the Kyropoulos method; 14 plate specimens of thicknesses from 0.008 mm to 10.53 mm; absorption coefficients directly determined; data extracted from a figure; temperature not specified, 293 K assumed.
16	28	Schneider, E.G.	1936	T	$6.25\times10^{4}-8.90\times10^{4}$	293	High purity; single crystal; grown by the Bridgman method; plate specimens of thickness from 0.5 to 25.0 mm; absorption coefficients directly determined; data extracted from a figure.
17	44	Eldridge, J.E.	1972	T	$1.6\times10^{2}-3.0\times10^{2}$	10	High purity; single crystal; obtained from the Harshaw Chemical Co.; plate specimens with thicknesses of 0.02, 0.1 and 0.8 cm and mechanically polished; spectral transmitted intensities measured; absorption coefficients determined with the aid of refractive index calculated from a dispersion formula; absorption-coefficient data extracted from a figure; estimated uncertainty about 10% except at long wavelength end where 100% uncertainty estimated.
18	35	Roessler, D.M. and Walker, W.C.	1967	R	$9.47\times10^{4}-2.02\times10^{5}$	300	Single crystal; obtained from the Harshaw Chemical Co.; freshly cleaved specimens; absorption coefficients determined from a Kramers-Kronig analysis of experimentally determined near normal reflection spectra; data extracted from a table.
19	41	Klier, M.	1958	R	$6.79\times10^{2}-1.83\times10^{3}$	77	Crystal; absorption-coefficient data deduced from reflectance and transmittance measurements on specimens of various thicknesses; data extracted from a figure.
20	41	Klier, M.	1958	R	$7.71\times10^{2}-1.83\times10^{3}$	195	Same as above.
21	41	Klier, M.	1958	R	$7.03\times10^{2}-1.82\times10^{3}$	293	Same as above.
22	41	Klier, M.	1958	R	$7.28\times10^{2}-1.83\times10^{3}$	573	Same as above.
23	41	Klier, M.	1958	T	28.7-191	77	Crystal; plate specimen; absorption coefficients deduced from transmittance measurements and estimated reflectivity; reflectivity estimated by assuming n = 3.07 for the whole wavelength range; data extracted from a figure; estimated uncertainty about 5 to 10%.
24	41	Klier, M.	1958	R	29-191	293	Same as above.

TABLE 3. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
25	41	Klier, M.	1958	R	29-193	573	Same as above.
26	38	Barker, A.J.	1972	R	$1.19x10^3$-$1.95x10^3$	300	Synthetic crystal; high purity; highly polished specimen of 1-2 mm thick; absorption coefficients deduced from measurements of reflectivity obtained using the obscured-mirror technique; absorption-coefficient data extracted from a figure.
27	38	Barker, A.J.	1972	R	$1.34x10^3$-$2.05x10^3$	705	Similar to above but at a higher temperature.
28	38	Barker, A.J.	1972	R	$1.39x10^3$-$2.1x10^3$	835	Similar to above but at a higher temperature.
29	38	Barker, A.J.	1972	R	$1.43x10^3$-$2.35x10^3$	975	Similar to above but at a higher temperature.
30	38	Barker, A.J.	1972	R	$1.59x10^3$-$2.4x10^3$	1160	Molten LiF specimen of 1-2 mm thick; reflectivity measurements carried out in a large inert gas atmosphere; absorption coefficients deduced from reflection spectra; absorption-coefficient data extracted from a figure; melting temperature of LiF is 1115K.
31	12	Deutsch, T.F.	1973	D	$1.44x10^3$-$2.31x10^3$	300	Single crystal; obtained from Harshaw Chemical Co.; specimen of 2.5 cm diameter and 2.5 cm long; differential technique used to determine absorption-coefficient data extracted from a figure.
32	42	Owens, J.	1968	L	$2.53x10^{-1}$-3.4	298	Single crystals; obtained from the Harshaw Chemical Co.; cylinder shaped specimen; filled resonant cavity method used for measuring dielectric constant and loss tangent; absorption coefficient then determined; data extracted from a figure.
33	39	Mead, D.	1974	R	$1.0x10^2$-$7.3x10^2$	1175	LiF melt; high purity; obtained from BDH Ltd.; near normal reflection spectrum obtained; absorption coefficient obtained by the Kramers-Kronig and classical oscillator analysis; data extracted from a smooth curve.
34	40	Kachare, A., Soriaga, M., and Andermann, G.	1974	R	$7.71x10^2$-$1.16x10^3$	300	Single crystal; polished and annealed; near normal reflection spectrum obtained; absorption coefficient deduced from reflection spectrum by the Kramers-Kronig analysis; data extracted from a figure.
35	40	Kachare, A., et al.	1974	R	$7.1x10^2$-$1.2x10^3$	80	Similar to above but at a lower temperature.
36	40	Kachare, A., et al.	1974	R	$7.19x10^2$-$1.15x10^3$	20	Similar to above but at a lower temperature.
37	45	Eldridge, J.E.	1972	T	75-178	63	Natural LiF crystals obtained from the Harshaw Chemical Co.; specimens of 1 x 2.5 cm with thicknesses varying from 0.02 to 0.1 cm; mechanically polished; absorption coefficients obtained from transmission measurements; data extracted from a figure.

TABLE 3. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
38	45	Eldridge, J.E.	1972	I	70-292	77	Same as above.
39	45	Eldridge, J.E.	1972	I	29-149	300	Same as above.
40	46	Heilmann, G.	1958	R	277-667	293	Single crystal; absorption coefficients determined from the reflectivity measurements from the polarized light at 20° and 70° incident angle; data extracted from a figure.
41	46	Heilmann, G.	1958	R	277-523	573	Same as above.
42	46	Heilmann, G.	1958	R	277-667	873	Same as above.
43	47	Genzel, L. and Klier, M.	1956	T	8.6-147	298	LiF crystal; plate specimens of 145 μm, 725 μm and 4.1 mm thick; absorption coefficients determined based on transmission measurements; data extracted from a figure.
44	48	Fröhlich, D.	1962	R	264-431	300.0	Thin evaporated film specimens of 2 to 5 μm thick; absorption coefficients determined from reflectivity measurements; data extracted from a figure.
45	49	Fröhlich, D.	1964	R	271-357	70	Single crystals; thin plate specimens; absorption coefficients determined from reflectivity measurements; data extracted from a figure.
46	49	Fröhlich, D.	1964	R	263-362	200	Same as above.
47	49	Fröhlich, D.	1964	R	263-364	300	Same as above.
48	50	Seger, G. and Genzel, L.	1962	T	10-33	298	Single crystals; plate specimens of 3, 6, 15, and 30 mm thick; absorption determined from transmission measurements; data extracted from a figure.
49	37	Tomiki, T. and Miyata, T.	1969	Z	9.1×10^4-9.8×10^4	298.5	Single crystal; ultraviolet quality from the Harshaw Chemical Co.; freshly cleaved specimens for absorption coefficient below 100 cm^{-1}; specimens for higher absorption prepared in high vacuum by melting the flakes of crystals between two plates of glassy carbon and pressed; reflection and transmission spectra obtained and absorption coefficient determined; data extracted from a figure.
50	37	Tomiki, T. and Miyata, T.	1969	Z	8.6×10^4-9.4×10^4	437	Same as above.
51	37	Tomiki, T. and Miyata, T.	1969	Z	8.5×10^4-9.3×10^4	510	Same as above.
52	37	Tomiki, T. and Miyata, T.	1969	Z	8.5×10^4-9.2×10^4	573	Same as above.

TABLE 3. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence) *(continued)*

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
53	37	Tomiki, T. and Miyata, T.	1969	Z	$5.3x10^4$-$9.7x10^4$	300	*Above specimen* except aged for two weeks.
54	37	Tomiki, T. and Miyata, T.	1969	Z	$7.9x10^4$-$9.8x10^4$	300	Similar to above except sample aged for one week.

TABLE 4. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence)

[Wavenumber, ν, cm⁻¹; Temperature, T, K; Absorption Coefficient, α, cm⁻¹]

ν	α	ν	α	ν	α	ν	α	ν	α	ν	α
DATA SET 1		DATA SET 2		DATA SET 3		DATA SET 4		DATA SET 5		DATA SET 6	
T = 7.5		T = 85.0		T = 295.0		T = 420.0		T = 605.0		T = 340.0	
5.882E+2	6.475E+3	5.882E+2	6.401E+3	5.882E+2	6.855E+3	5.882E+2	7.053E+3	5.882E+2	6.693E+3	5.882E+2	6.456E+3
5.263E+2	6.795E+3	5.263E+2	6.363E+3	5.263E+2	9.015E+3	5.263E+2	9.226E+3	5.263E+2	9.155E+3	5.263E+2	6.594E+3
4.762E+2	1.017E+4	4.762E+2	9.333E+3	4.762E+2	9.712E+3	4.762E+2	9.775E+3	4.762E+2	9.772E+3	4.762E+2	9.659E+3
4.348E+2	1.235E+4	4.348E+2	1.197E+4	4.348E+2	1.152E+4	4.348E+2	1.135E+4	4.348E+2	1.035E+4	4.348E+2	1.057E+4
4.167E+2	1.351E+4	4.167E+2	1.313E+4	4.167E+2	1.254E+4	4.167E+2	1.231E+4	4.167E+2	1.1[illegible]E+4	4.167E+2	1.0[illegible]3E+4
4.000E+2	1.439E+4	4.000E+2	1.439E+4	4.000E+2	1.364E+4	4.000E+2	1.332E+4	4.000E+2	1.256E+4	4.000E+2	1.153E+4
3.846E+2	1.643E+4	3.846E+2	1.583E+4	3.846E+2	1.487E+4	3.846E+2	1.442E+4	3.846E+2	1.346E+4	3.846E+2	1.243E+4
3.704E+2	1.857E+4	3.704E+2	1.744E+4	3.704E+2	1.630E+4	3.704E+2	1.566E+4	3.704E+2	1.442E+4	3.704E+2	1.295E+4
3.571E+2	2.14[illegible]E+4	3.571E+2	2.0[illegible]E+4	3.571E+2	1.805E+4	3.571E+2	1.711E+4	3.571E+2	1.546E+4	3.571E+2	1.35[illegible]E+4
3.448E+2	2.537E+4	3.448E+2	2.349E+4	3.448E+2	2.033E+4	3.448E+2	1.885E+4	3.448E+2	1.659E+4	3.448E+2	1.415E+4
3.390E+2	2.939E+4	3.390E+2	2.594E+4	3.390E+2	2.177E+4	3.390E+2	1.987E+4	3.390E+2	1.717E+4	3.390E+2	1.440E+4
3.333E+2	3.477E+4	3.333E+2	2.932E+4	3.333E+2	2.347E+4	3.333E+2	2.100E+4	3.333E+2	1.774E+4	3.333E+2	1.475E+4
3.300E+2	3.877E+4	3.279E+2	3.432E+4	3.300E+2	2.466E+4	3.300E+2	2.173E+4	3.300E+2	1.814E+4	3.300E+2	1.491E+4
3.279E+2	4.454E+4	3.226E+2	4.240E+4	3.279E+2	2.553E+4	3.279E+2	2.223E+4	3.279E+2	1.839E+4	3.279E+2	1.502E+4
3.257E+2	5.137E+4	3.205E+2	4.092E+4	3.257E+2	2.647E+4	3.257E+2	2.275E+4	3.257E+2	1.861E+4	3.257E+2	1.511E+4
3.236E+2	[illegible]	3.1[illegible]5E+2	5.107E+4	3.236E+2	2.748E+4	3.236E+2	2.327E+4	3.236E+2	1.883E+4	3.236E+2	1.52[illegible]E+4
3.226E+2	6.345E+4	3.175E+2	5.318E+4	3.226E+2	2.80[illegible]E+4	3.226E+2	2.354E+4	3.226E+2	1.894E+4	3.226E+2	1.525E+4
3.215E+2	7.753E+4	3.165E+2	5.281E+4	3.215E+2	2.854E+4	3.215E+2	2.380E+4	3.215E+2	1.905E+4	3.215E+2	1.529E+4
3.205E+2	7.322E+4	3.155E+2	4.939E+4	3.205E+2	2.909E+4	3.205E+2	2.405E+4	3.205E+2	1.915E+4	3.205E+2	1.533E+4
3.195E+2	5.701E+4	3.145E+2	4.276E+4	3.195E+2	2.965E+4	3.195E+2	2.431E+4	3.195E+2	1.925E+4	3.195E+2	1.537E+4
3.185E+2	3.295E+4	3.135E+2	3.471E+4	3.185E+2	3.021E+4	3.185E+2	2.455E+4	3.185E+2	1.934E+4	3.185E+2	1.540E+4
3.175E+2	1.957E+4	3.125E+2	2.725E+4	3.175E+2	3.076E+4	3.175E+2	2.479E+4	3.175E+2	1.943E+4	3.175E+2	1.543E+4
3.165E+2	1.363E+4	3.115E+2	2.094E+4	3.165E+2	3.129E+4	3.165E+2	2.501E+4	3.165E+2	1.951E+4	3.165E+2	1.546E+4
3.155E+2	9.435E+3	3.077E+2	9.473E+3	3.155E+2	3.179E+4	3.155E+2	2.521E+4	3.155E+2	1.956E+4	3.155E+2	1.549E+4
3.135E+2	5.633E+3	3.030E+2	4.706E+3	3.135E+2	3.259E+4	3.135E+2	2.555E+4	3.135E+2	1.971E+4	3.135E+2	1.553E+4
3.115E+2	3.835E+3	2.985E+2	2.963E+3	3.115E+2	3.293E+4	3.115E+2	2.576E+4	3.115E+2	1.979E+4	3.115E+2	1.557E+4
3.096E+2	2.361E+3	2.941E+2	2.033E+3	3.096E+2	3.249E+4	3.096E+2	2.579E+4	3.096E+2	1.984E+4	3.096E+2	1.553E+4
3.077E+2	2.155E+3	2.899E+2	1.530E+3	3.077E+2	3.099E+4	3.077E+2	2.558E+4	3.077E+2	1.983E+4	3.077E+2	1.558E+4
3.030E+2	1.333E+3	2.857E+2	1.265E+3	3.030E+2	2.323E+4	3.030E+2	2.378E+4	3.030E+2	1.952E+4	3.030E+2	1.552E+4
2.899E+2	5.635E+2	2.703E+2	5.774E+2	2.899E+2	6.514E+3	2.899E+2	1.234E+4	2.899E+2	1.581E+4	2.899E+2	1.453E+4
2.703E+2	2.377E+2	2.500E+2	3.142E+2	2.703E+2	2.132E+3	2.703E+2	4.027E+3	2.703E+2	7.741E+3	2.703E+2	1.006E+4
2.500E+2	1.257E+2	2.222E+2	1.390E+2	2.500E+2	9.942E+2	2.500E+2	1.563E+3	2.500E+2	3.052E+3	2.500E+2	6.206E+3
2.222E+2	5.595E+1	2.000E+2	1.065E+2	2.222E+2	4.591E+2	2.222E+2	8.389E+2	2.222E+2	1.613E+3	2.222E+2	2.995E+3
2.000E+2	5.027E+1	1.429E+2	3.590E+1	2.000E+2	2.767E+2	2.000E+2	4.981E+2	2.000E+2	9.415E+2	2.000E+2	1.730E+3
1.667E+2	2.094E+1	1.000E+2	1.257E+1	1.667E+2	1.399E+2	1.667E+2	2.434E+2	1.667E+2	4.599E+2	1.667E+2	8.336E+2
				1.000E+2	3.468E+1	1.000E+2	6.057E+1	1.000E+2	1.398E+2	1.000E+2	1.949E+2

TABLE 4. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence) (continued)

DATA SET 7
T = 1000.0

ν	α
5.682E+2	5.817E+3
5.263E+2	7.857E+3
4.702E+2	9.302E+3
4.34[illegible]E+2	1.0[illegible]9E+4
4.107E+2	1.07[illegible]E+4
[illegible]E+2	1.059E+4
3.846E+2	1.097E+4
3.764E+2	1.103E+4
3.572E+2	1.132E+4
3.448E+2	1.222E+4
3.39[illegible]E+2	1.24[illegible]E+4
3.333E+2	1.255E+4
3.30[illegible]E+2	1.265E+4
3.279E+2	1.270E+4
3.257E+2	1.275E+4
3.236E+2	1.2[illegible]E+4
3.226E+2	1.282E+4
3.215E+2	1.284E+4
3.205E+2	1.2[illegible]5E+4
3.195E+2	1.28[illegible]E+4
3.1[illegible]E+2	1.29[illegible]E+4
3.175E+2	1.27[illegible]E+4
3.16[illegible]E+2	1.293E+4
3.155E+2	1.294E+4
3.13[illegible]E+2	1.2[illegible]E+4
3.11[illegible]E+2	1.293E+4
3.096E+2	1.29[illegible]E+4
3.077E+2	1.2[illegible]3E+4
3.0[illegible]E+2	1.2[illegible]E+4
2.893E+2	1.257E+4
2.7[illegible]3E+2	1.034E+4
2.500E+2	7.9[illegible]7E+3
2.222E+2	4.343E+3
[illegible]E+2	2.529E+3
1.667E+2	1.273E+3
1.600E+2	2.956E+2

DATA SET 8
T = 298.0

ν	α
1.298E+5	3.310E+5
1.[illegible]E+5	3.69[illegible]E+5
1.[illegible]82E+5	5.44[illegible]E+5
1.173E+5	8.223E+5
1.[illegible]E+5	1.[illegible]18E+6
1.[illegible]5E+5	1.268E+6
1.049E+5	1.403E+6
1.045E+5	1.5[illegible]2E+6
1.041E+5	1.714E+6
1.03[illegible]E+5	1.839E+6
1.[illegible]33[illegible]E+5	2.181E+6
1.029E+5	2.10[illegible]E+6
1.026E+5	2.23[illegible]E+6
1.0[illegible]5E+5	2.152E+6
1.017E+5	2.032E+6
1.0[illegible]9E+5	1.52[illegible]E+6
1.00[illegible]E+5	9.347E+5
9.327E+4	6.[illegible]7E+5
9.803E+4	4.21[illegible]E+5
9.782E+4	2.95[illegible]E+5
9.677E+4	1.581E+5
9.613E+4	8.456E+4

DATA SET 9
T = 293.0

ν	α
9.573E+4	3.030E+1
9.520E+4	1.49[illegible]E+1
9.4[illegible]E+4	9.9[illegible]E+0
9.419E+4	6.3[illegible]E+0
9.347E+4	4.4[illegible]E+0
9.185E+4	2.8[illegible]E+0
9.[illegible]E+4	2.2[illegible]E+0
8.971E+4	2.2[illegible]E+0
8.835E+4	1.8[illegible]E+0
8.54[illegible]E+4	1.70[illegible]E+0
8.347E+4	1.50[illegible]E+0
8.121E+4	1.2[illegible]E+0
7.815E+4	1.[illegible]E+0

DATA SET 9(CONT.)

ν	α
7.443E+4	5.0[illegible]E-1
7.069E+4	5.[illegible]E-1
6.806E+4	3.[illegible]E-1
6.4[illegible]3E+4	2.[illegible]E-1

DATA SET 10
T = 293.0

ν	α
8.048E+4	6.400E+1
7.855E+4	4.880E+1
7.685E+4	3.430E+1
7.565E+4	2.440E+1
7.470E+4	1.710E+1
7.355E+4	1.260E+1
7.153E+4	7.5[illegible]E+0
6.960E+4	5.300E+0
6.839E+4	4.000E+0
6.718E+4	3.000E+0
6.645E+4	2.[illegible]E+0
6.47[illegible]E+4	2.[illegible]E+0
6.323E+4	1.700E+0
6.[illegible]5E+4	1.300E+0
5.815E+4	1.300E+0
5.589E+4	1.1[illegible]E+0
5.403E+4	1.[illegible]E+0
5.252E+4	1.[illegible]E+0

DATA SET 11
T = 39[illegible].0

ν	α
4.831E+4	5.[illegible]E-1
4.765E+4	4.510E-1
4.587E+4	3.560E-1
4.336E+4	2.920E-1
4.107E+4	2.443E-1
4.0[illegible]E+4	2.170E-1
3.846E+4	2.[illegible]E-1
3.521E+4	1.770E-1
3.269E+4	1.550E-1
3.155E+4	1.220E-1

DATA SET 11(CONT.)

ν	α
3.021E+4	1.[illegible]E-1
2.907E+4	8.[illegible]E-2
2.[illegible]9E+4	6.5[illegible]E-2
2.703E+4	5.5[illegible]E-2
2.597E+4	4.4[illegible]E-2
2.469E+4	3.1[illegible]E-2
2.331E+4	2.3[illegible]E-2
2.212E+4	1.7[illegible]E-2
2.075E+4	1.20[illegible]E-2
1.972E+4	9.[illegible]E-3
1.890E+4	7.[illegible]E-3

DATA SET 12
T = 39[illegible].0

ν	α
4.717E+4	2.21[illegible]E-2
4.292E+4	1.24[illegible]E-2
4.215E+4	1.45[illegible]E-2
3.717E+4	8.3[illegible]E-3
3.333E+4	4.[illegible]E-3
2.950E+4	1.700E-3
2.681E+4	8.[illegible]E-4

DATA SET 13
T = 3[illegible].0

ν	α
3.852E+3	4.[illegible]E-3
3.845E+3	7.[illegible]E-3
3.83[illegible]E+3	1.[illegible]E-2
3.824E+3	1.4[illegible]E-2
3.814E+3	1.9[illegible]E-2
3.807E+3	2.5[illegible]E-2
3.79[illegible]E+3	3.2[illegible]E-2
3.79[illegible]E+3	3.3[illegible]E-2
3.7[illegible]5E+3	4.9[illegible]E-2
3.775E+3	6.100E-2
3.774E+3	7.600E-2
3.768E+3	9.7[illegible]E-2
3.764E+3	1.23[illegible]E-1
3.759E+3	1.54[illegible]E-1

DATA SET 13(CONT.)

ν	α
3.757E+3	1.73[illegible]E-1
3.754E+3	2.05[illegible]E-1
3.748E+3	2.57[illegible]E-1
3.747E+3	2.99[illegible]E-1
3.738E+3	3.820E-1
3.736E+3	3.93[illegible]E-1
3.731E+3	3.84[illegible]E-1
3.727E+3	3.52[illegible]E-1
3.720E+3	2.6[illegible]E-1
3.716E+3	2.0[illegible]E-1
3.711E+3	1.6[illegible]E-1
3.705E+3	1.36[illegible]E-1
3.695E+3	1.[illegible]9[illegible]E-1
3.686E+3	9.4[illegible]E-2
3.681E+3	7.4[illegible]E-2
3.676E+3	8.3[illegible]E-2
3.672E+3	9.5[illegible]E-2
3.670E+3	8.[illegible]E-2
3.66[illegible]E+3	6.[illegible]E-2
3.[illegible]2E+3	4.4[illegible]E-2
3.659E+3	4.0[illegible]E-2
3.655E+3	4.[illegible]E-2
3.647E+3	4.[illegible]E-2
3.643E+3	5.7[illegible]E-2
3.640E+3	5.7[illegible]E-2
3.635E+3	5.[illegible]E-2
3.630E+3	5.4[illegible]E-2
3.626E+3	8.[illegible]E-2
3.623E+3	9.7[illegible]E-2
3.619E+3	1.05[illegible]E-1
3.618E+3	9.7[illegible]E-2
3.611E+3	5.0[illegible]E-2
3.609E+3	3.3[illegible]E-2
3.604E+3	2.4[illegible]E-2
3.598E+3	2.4[illegible]E-2
3.593E+3	1.6[illegible]E-2
3.589E+3	1.600E-2
3.582E+3	2.4[illegible]E-2
3.578E+3	2.4[illegible]E-2
3.571E+3	1.700E-2

DATA SET 13(CONT.)

ν	α
3.563E+3	1.330E-2
3.550E+3	6.[illegible]E-3
3.535E+3	2.000E-3

DATA SET 14
T = 293.0

ν	α
5.348E+4	3.451E+0
5.155E+4	2.447E+0
5.025E+4	1.810E+0
4.920E+4	1.595E+0
4.[illegible]75E+4	1.449E+0
4.739E+4	1.35[illegible]E+0
4.673E+4	1.151E+0
4.506E+4	6.4[illegible]E-1
4.4[illegible]E+4	5.57[illegible]E-1
4.31[illegible]E+4	6.3[illegible]E-2
4.[illegible]E+4	5.3[illegible]E-2
4.[illegible]3[illegible]E+4	2.1[illegible]E-1
3.937E+4	3.2[illegible]E-1
3.748E+4	3.47[illegible]E-1
3.717E+4	3.33[illegible]E-1
3.6[illegible]E+4	1.93[illegible]E-1
3.571E+4	1.40[illegible]E-1
3.5[illegible]E+4	6.800E-2
3.[illegible]E+4	9.[illegible]E-3

DATA SET 15
T = 293.0

ν	α
2.[illegible]E+3	3.7[illegible]E-2
1.81[illegible]E+3	1.55[illegible]E-1
1.667E+3	4.4[illegible]E-1
1.53[illegible]E+3	9.9[illegible]E-1
1.429E+3	2.0[illegible]E+0
1.333E+3	4.1[illegible]E+0
1.25[illegible]E+3	7.3[illegible]E+0
1.176E+3	9.500E+0
1.111E+3	1.2[illegible]E+1
1.053E+3	1.950E+1

TABLE 4. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence) (continued)

ν	α	ν	α	ν	α	ν	α	ν	α	ν	α
DATA SET 15(CONT.)		DATA SET 16(CONT.)		DATA SET 18		DATA SET 18(CONT.)		DATA SET 18(CONT.)		DATA SET 19(CONT.)	
				T = 300.0							
1.000E+3	3.370E+1	7.598E+4	4.456E-1			1.169E+5	1.087E+6	1.855E+5	1.725E+6	9.542E+2	2.306E+1
9.524E+2	4.459E+1	7.553E+4	3.700E-1	9.476E+4	1.191E+4	1.177E+5	1.095E+6	1.859E+5	1.682E+6	9.320E+2	2.447E+1
9.091E+2	6.210E+1	7.424E+4	3.006E-1	9.677E+4	1.338E+5	1.185E+5	1.067E+6	1.863E+5	1.639E+6	9.130E+2	2.850E+1
8.595E+2	9.000E+1	7.153E+4	2.500E-1	9.839E+4	2.644E+5	1.202E+5	1.072E+6	1.871E+5	1.552E+6	8.921E+2	3.627E+1
8.432E+2	1.212E+2	6.900E+4	2.100E-1	9.919E+4	4.113E+5	1.218E+5	1.041E+6	1.879E+5	1.464E+6	8.715E+2	4.302E+1
8.333E+2	1.450E+2	6.607E+4	1.808E-1	9.759E+4	5.865E+5	1.234E+5	9.458E+5	1.887E+5	1.399E+6	8.532E+2	5.067E+1
8.294E+2	1.565E+2	6.400E+4	1.300E-1	1.008E+5	1.482E+6	1.250E+5	9.268E+5	1.903E+5	1.339E+6	8.347E+2	7.450E+1
8.183E+2	1.924E+2	6.250E+4	8.006E-2	1.016E+5	2.425E+6	1.266E+5	8.274E+5	1.911E+5	1.201E+6	8.190E+2	9.784E+1
8.000E+2	2.106E+2			1.020E+5	2.667E+6	1.274E+5	7.526E+5	1.935E+5	1.022E+6	8.032E+2	1.236E+2
7.952E+2	2.255E+2	DATA SET 17		1.024E+5	2.819E+6	1.282E+5	6.768E+5	1.976E+5	7.697E+5	7.862E+2	1.345E+2
7.899E+2	2.251E+2	T = 10.0		1.028E+5	2.843E+6	1.290E+5	6.046E+5	2.016E+5	5.827E+5	7.710E+2	1.453E+2
7.858E+2	2.323E+2			1.032E+5	2.763E+6	1.293E+5	6.363E+5			7.407E+2	1.390E+2
7.800E+2	2.372E+2	2.990E+2	1.420E+1	1.036E+5	2.631E+6	1.306E+5	6.403E+5	DATA SET 19		7.289E+2	1.432E+2
7.740E+2	2.351E+2	2.945E+2	6.037E+0	1.040E+5	2.484E+6	1.323E+5	6.648E+5	T = 77.0		7.148E+2	1.575E+2
7.699E+2	2.325E+2	2.919E+2	4.345E+0	1.044E+5	2.323E+6	1.363E+5	8.050E+5			7.027E+2	1.770E+2
7.690E+2	2.300E+2	2.900E+2	3.341E+0	1.048E+5	2.121E+6	1.393E+5	8.941E+5	1.825E+3	3.600E-2	6.900E+2	2.010E+2
7.639E+2	2.290E+2	2.883E+2	2.559E+0	1.052E+5	2.023E+6	1.403E+5	9.169E+5	1.746E+3	6.393E-2	6.793E+2	2.417E+2
7.593E+2	2.154E+2	2.865E+2	1.995E+0	1.056E+5	1.899E+6	1.411E+5	9.399E+5	1.681E+3	1.016E-1		
7.547E+2	2.097E+2	2.834E+2	1.445E+0	1.060E+5	1.772E+6	1.419E+5	9.275E+5	1.620E+3	1.353E-1	DATA SET 20	
7.505E+2	2.075E+2	2.803E+2	1.043E+0	1.065E+5	1.625E+6	1.427E+5	9.327E+5	1.549E+3	3.429E-1	T = 195.0	
7.463E+2	2.075E+2	2.774E+2	7.935E-1	1.069E+5	1.477E+6	1.452E+5	8.756E+5	1.513E+3	4.316E-1		
7.407E+2	2.037E+2	2.737E+2	5.997E-1	1.073E+5	1.361E+6	1.476E+5	8.345E+5	1.488E+3	4.713E-1	1.825E+3	5.756E-2
7.364E+2	2.147E+2	2.700E+2	4.677E-1	1.077E+5	1.245E+6	1.484E+5	8.205E+5	1.460E+3	6.045E-1	1.754E+3	5.017E-2
7.241E+2	2.443E+2	2.656E+2	3.598E-1	1.081E+5	1.141E+6	1.492E+5	8.249E+5	1.409E+3	9.288E-1	1.675E+3	1.532E-1
7.143E+2	3.000E+2	2.600E+2	2.831E-1	1.085E+5	1.036E+6	1.500E+5	8.294E+5	1.364E+3	1.387E+0	1.609E+3	2.475E-1
6.997E+2	4.500E+2	2.559E+2	2.334E-1	1.089E+5	9.160E+5	1.532E+5	9.056E+5	1.318E+3	2.143E+0	1.548E+3	4.140E-1
6.867E+2	1.700E+3	2.505E+2	1.941E-1	1.093E+5	7.964E+5	1.573E+5	1.047E+6	1.297E+3	2.595E+0	1.493E+3	6.200E-1
6.452E+2	3.500E+3	2.447E+2	1.577E-1	1.097E+5	6.891E+5	1.613E+5	1.176E+6	1.277E+3	3.217E+0	1.439E+3	9.446E-1
6.349E+2	4.200E+3	2.394E+2	1.330E-1	1.101E+5	5.948E+5	1.653E+5	1.350E+6	1.252E+3	3.773E+0	1.389E+3	1.425E+0
		2.320E+2	1.126E-1	1.105E+5	5.831E+5	1.694E+5	1.554E+6	1.235E+3	4.352E+0	1.370E+3	1.602E+0
DATA SET 16		2.254E+2	9.079E-2	1.109E+5	6.410E+5	1.726E+5	1.735E+6	1.215E+3	4.784E+0	1.340E+3	2.200E+0
T = 293.0		2.192E+2	7.626E-2	1.113E+5	7.272E+5	1.742E+5	1.939E+6	1.200E+3	5.089E+0	1.319E+3	2.556E+0
		2.075E+2	6.252E-2	1.117E+5	7.860E+5	1.758E+5	1.944E+6	1.179E+3	5.253E+0	1.297E+3	3.252E+0
8.897E+4	2.320E+0	1.999E+2	5.572E-2	1.121E+5	8.311E+5	1.774E+5	2.073E+6	1.144E+3	5.492E+0	1.277E+3	4.030E+0
8.703E+4	1.950E+0	1.930E+2	4.742E-2	1.125E+5	8.705E+5	1.790E+5	2.115E+6	1.131E+3	5.736E+0	1.233E+3	5.299E+0
8.518E+4	1.510E+0	1.833E+2	4.131E-2	1.129E+5	9.080E+5	1.806E+5	2.066E+6	1.112E+3	5.747E+0	1.215E+3	5.725E+0
8.340E+4	1.130E+0			1.137E+5	9.717E+5	1.823E+5	1.993E+6	1.099E+3	6.112E+0	1.179E+3	6.499E+0
8.170E+4	9.560E-1			1.145E+5	1.022E+6	1.839E+5	1.872E+6	1.071E+3	7.428E+0	1.147E+3	7.256E+0
8.000E+4	8.300E-1			1.153E+5	1.043E+6	1.847E+5	1.810E+6	1.029E+3	1.147E+1	1.126E+3	7.495E+0
7.862E+4	5.600E-1			1.161E+5	1.065E+6	1.851E+5	1.768E+6	9.785E+2	1.967E+1	1.093E+3	8.586E+0

TABLE 4. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence) (continued)

DATA SET 20 (CONT.)

ν	α
1.156E+3	1.1[illegible]E+1
1.130E+3	1.425E+1
1.100E+3	1.833E+1
9.766E+2	2.523E+1
9.560E+2	3.040E+1
9.116E+2	4.230E+1
8.718E+2	6.304E+1
8.354E+2	9.833E+1
8.133E+2	1.248E+2
8.019E+2	1.511E+2
7.874E+2	1.751E+2
7.710E+2	1.863E+2

DATA SET 21
T = 293.0

ν	α
1.915E+3	8.223E-2
1.742E+3	1.355E-1
1.657E+3	2.124E-1
1.605E+3	3.825E-1
1.543E+3	6.401E-1
1.508E+3	9.427E-1
1.480E+3	9.899E-1
1.460E+3	1.130E+0
1.433E+3	1.477E+0
1.400E+3	1.740E+0
1.345E+3	2.241E+0
1.366E+3	2.521E+0
1.330E+3	2.990E+0
1.321E+3	3.421E+0
1.300E+3	4.057E+0
1.260E+3	4.770E+0
1.229E+3	6.499E+0
1.211E+3	7.051E+0
1.190E+3	7.779E+0
1.158E+3	8.754E+0
1.144E+3	9.193E+0
1.126E+3	9.927E+0
1.093E+3	1.132E+1
9.590E+2	2.392E+1

DATA SET 21 (CONT.)

ν	α
9.533E+2	4.022E+1
9.320E+2	4.749E+1
9.091E+2	5.073E+1
8.905E+2	6.956E+1
8.690E+2	8.327E+1
8.525E+2	1.004E+2
8.340E+2	1.193E+2
8.143E+2	1.528E+2
8.013E+2	1.842E+2
7.862E+2	2.083E+2
7.564E+2	2.394E+2
7.418E+2	2.365E+2
7.283E+2	2.387E+2
7.148E+2	2.474E+2
7.032E+2	2.681E+2

DATA SET 22
T = 573.0

ν	α
1.809E+3	2.458E-1
1.745E+3	4.167E-1
1.673E+3	6.758E-1
1.600E+3	1.051E+0
1.540E+3	1.525E+0
1.444E+3	2.094E+0
1.441E+3	3.018E+0
1.391E+3	4.193E+0
1.339E+3	5.720E+0
1.299E+3	7.420E+0
1.259E+3	9.329E+0
1.220E+3	1.210E+1
1.149E+3	1.767E+1
1.095E+3	2.415E+1
1.032E+3	3.471E+1
9.735E+2	5.294E+1
9.320E+2	7.630E+1
8.921E+2	1.137E+2
8.720E+2	1.374E+2
8.354E+2	1.893E+2
8.019E+2	2.567E+2

DATA SET 22 (CONT.)

ν	α
7.716E+2	3.425E+2
7.559E+2	3.887E+2
7.283E+2	4.737E+2

DATA SET 23
T = 77.0

ν	α
1.905E+2	2.410E+1
1.560E+2	1.723E+1
1.233E+2	1.133E+1
9.506E+1	8.734E+0
7.178E+1	1.859E+0
2.871E+1	1.167E-1

DATA SET 24
T = 293.0

ν	α
1.910E+2	2.179E+2
1.589E+2	1.630E+2
1.227E+2	1.107E+2
9.061E+1	8.714E+1
7.228E+1	2.490E+1
2.904E+1	2.467E+0

DATA SET 25
T = 573.0

ν	α
1.932E+2	6.625E+2
1.569E+2	5.131E+2
1.233E+2	3.717E+2
9.594E+1	2.892E+2
7.201E+1	9.593E+1
2.911E+1	1.189E+1

DATA SET 26
T = 300.0

ν	α
1.945E+3	9.000E-2
1.844E+3	1.200E-1
1.744E+3	2.400E-1

DATA SET 26 (CONT.)

ν	α
1.643E+3	5.200E-1
1.545E+3	1.080E+0
1.447E+3	1.850E+0
1.395E+3	2.530E+0
1.346E+3	3.680E+0
1.292E+3	5.600E+0
1.240E+3	7.890E+0
1.191E+3	9.960E+0

DATA SET 27
T = 705.0

ν	α
2.042E+3	1.600E-1
1.945E+3	3.000E-1
1.844E+3	5.400E-1
1.742E+3	9.700E-1
1.644E+3	1.780E+0
1.597E+3	2.360E+0
1.544E+3	3.170E+0
1.492E+3	4.260E+0
1.446E+3	5.590E+0
1.389E+3	7.270E+0
1.341E+3	9.580E+0

DATA SET 28
T = 835.0

ν	α
2.093E+3	1.900E-1
1.994E+3	3.300E-1
1.894E+3	6.200E-1
1.795E+3	1.100E+0
1.743E+3	1.450E+0
1.694E+3	1.920E+0
1.642E+3	2.520E+0
1.593E+3	3.310E+0
1.542E+3	4.350E+0
1.492E+3	5.750E+0
1.440E+3	7.510E+0
1.393E+3	9.720E+0

DATA SET 29
T = 975.0

ν	α
2.343E+3	1.000E-1
2.240E+3	1.300E-1
2.142E+3	2.000E-1
2.042E+3	3.300E-1
1.943E+3	7.100E-1
1.843E+3	1.170E+0
1.743E+3	2.000E+0
1.701E+3	2.620E+0
1.644E+3	3.370E+0
1.592E+3	4.370E+0
1.543E+3	5.680E+0
1.490E+3	7.360E+0
1.434E+3	9.560E+0

DATA SET 30
T = 1160.0

ν	α
2.400E+3	1.500E-1
2.294E+3	2.200E-1
2.193E+3	4.000E-1
2.094E+3	7.100E-1
1.992E+3	1.240E+0
1.895E+3	1.910E+0
1.845E+3	2.470E+0
1.798E+3	3.290E+0
1.743E+3	4.200E+0
1.697E+3	5.540E+0
1.639E+3	7.180E+0
1.591E+3	9.020E+0

DATA SET 31
T = 300.0

ν	α
2.304E+3	5.900E-3
2.203E+3	1.150E-2
2.101E+3	2.180E-2
2.004E+3	4.230E-2
1.949E+3	6.240E-2
1.901E+3	8.200E-2

DATA SET 31 (CONT.)

ν	α
1.855E+3	1.143E-1
1.802E+3	1.740E-1
1.751E+3	2.406E-1
1.701E+3	3.420E-1
1.655E+3	5.070E-1
1.605E+3	7.031E-1
1.550E+3	9.397E-1
1.497E+3	1.306E+0
1.449E+3	1.574E+0

DATA SET 32
T = 298.0

ν	α
3.404E+0	2.754E-4
8.750E-1	6.516E-4
2.535E-1	1.242E-3

DATA SET 33
T = 1175.0

ν	α
7.270E+2	2.832E+3
6.870E+2	3.453E+3
6.540E+2	4.1[illegible]E+3
6.010E+2	5.0[illegible]E+3
5.700E+2	5.659E+3
5.400E+2	6.240E+3
4.800E+2	6.997E+3
4.620E+2	7.625E+3
4.370E+2	6.974E+3
4.180E+2	6.770E+3
3.800E+2	6.354E+3
3.670E+2	6.042E+3
3.440E+2	5.620E+3
3.240E+2	5.130E+3
2.900E+2	4.373E+3
2.570E+2	3.595E+3
2.290E+2	2.935E+3
2.110E+2	2.545E+3
1.590E+2	1.678E+3
1.360E+2	1.111E+3

TABLE 4. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence) (continued)

ν	α
DATA SET 33(CONT.)	
1.000E+2	5.905E+2
DATA SET 34	
T = 300.0	
1.160E+3	8.745E+0
1.139E+3	8.593E+0
1.101E+3	4.151E+0
1.051E+3	9.333E+0
[illegible]	9.143E+0
[illegible]	2.491E+1
[illegible]	4.227E+1
[illegible]	4.995E+1
[illegible]	5.324E+1
[illegible]	6.907E+1
[illegible]	8.947E+1
[illegible]	1.524E+2
[illegible]	[illegible]
[illegible]	1.937E+2
[illegible]	2.117E+2
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
7.710E+2	[illegible]
7.710E+2	2.315E+2
DATA SET 35	
T = 50.0	
1.152E+3	[illegible]
1.133E+3	1.279E+1
1.076E+3	1.745E+1
[illegible]	[illegible]
[illegible]	2.055E+1
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
7.990E+2	[illegible]
7.780E+2	[illegible]
7.590E+2	[illegible]

ν	α
DATA SET 35(CONT.)	
[illegible]	1.328E+2
7.290E+2	1.475E+2
[illegible]	1.954E+2
DATA SET 36	
T = 20.0	
1.150E+3	5.781E+0
1.032E+3	[illegible]
1.073E+3	6.742E+0
1.044E+3	[illegible]
1.036E+3	1.042E+1
1.022E+3	1.793E+1
1.007E+3	2.273E+1
1.002E+3	2.392E+1
9.932E+2	2.113E+1
[illegible]	[illegible]
[illegible]	2.316E+1
9.190E+2	3.455E+1
[illegible]	[illegible]
8.750E+2	5.493E+1
[illegible]	[illegible]
7.903E+2	[illegible]
[illegible]	1.457E+2
[illegible]	1.405E+2
[illegible]	[illegible]
[illegible]	1.303E+2
7.593E+2	1.183E+2
[illegible]	1.164E+2
[illegible]	1.235E+2
[illegible]	[illegible]
[illegible]	1.432E+2
[illegible]	[illegible]
DATA SET 37	
T = 63.0	
[illegible]	0.971E+0
[illegible]	[illegible]
[illegible]	[illegible]

ν	α
DATA SET 37(CONT.)	
0.944E+2	0.221E+1
0.926E+2	0.215E+1
[illegible]	[illegible]
[illegible]	[illegible]
0.109E+3	0.263E+1
0.113E+3	0.255E+1
0.124E+3	[illegible]
0.133E+3	0.373E+1
0.139E+3	0.398E+1
0.140E+3	[illegible]
0.159E+3	0.512E+1
0.163E+3	0.504E+1
0.167E+3	[illegible]
[illegible]	0.600E+1
0.178E+3	[illegible]
DATA SET 38	
T = 77.0	
0.696E+2	0.971E+0
0.735E+2	[illegible]
0.701E+2	[illegible]
0.787E+2	0.659E+1
0.828E+2	0.724E+1
[illegible]	0.669E+1
[illegible]	0.619E+1
[illegible]	0.691E+1
[illegible]	0.714E+1
0.121E+3	[illegible]
0.135E+3	[illegible]
[illegible]	0.793E+1
0.147E+3	0.877E+1
0.156E+3	[illegible]
[illegible]	[illegible]
0.181E+3	[illegible]
0.197E+3	0.165E+2
0.222E+3	0.231E+2
0.239E+3	0.275E+2
0.250E+3	0.307E+2
0.257E+3	0.351E+2

ν	α
DATA SET 38(CONT.)	
0.268E+3	0.402E+2
0.276E+3	0.494E+2
0.294E+3	0.617E+2
0.287E+3	0.734E+2
0.292E+3	0.833E+2
DATA SET 39	
T = 300.0	
0.280E+2	[illegible]
0.273E+2	[illegible]
0.299E+2	0.140E+1
0.306E+2	[illegible]
[illegible]	0.457E+1
0.514E+2	0.889E+1
0.595E+2	[illegible]
0.676E+2	0.237E+2
[illegible]	0.392E+2
0.755E+2	0.654E+2
[illegible]	0.950E+2
0.864E+2	0.105E+3
0.919E+2	0.121E+3
0.959E+2	[illegible]
0.107E+3	0.116E+3
0.111E+3	0.121E+3
0.115E+3	0.116E+3
[illegible]	0.123E+3
0.134E+3	0.125E+3
0.149E+3	0.125E+3
DATA SET 40	
T = 293.0	
6.607E+2	[illegible]
[illegible]	5.359E+3
5.889E+2	6.741E+3
5.504E+2	9.264E+3
5.273E+2	1.006E+4
[illegible]	9.741E+3
4.773E+2	9.945E+3

ν	α
DATA SET 40(CONT.)	
4.546E+2	8.849E+3
4.353E+2	1.073E+4
[illegible]	[illegible]
3.845E+2	1.135E+4
3.694E+2	1.284E+4
3.571E+2	[illegible]
3.436E+2	1.552E+4
3.324E+2	1.709E+4
3.211E+2	1.990E+4
3.117E+2	2.197E+4
[illegible]	2.703E+4
[illegible]	1.553E+4
2.856E+2	9.257E+3
2.773E+2	7.746E+3
DATA SET 41	
T = 571.0	
6.232E+2	[illegible]
5.547E+2	9.814E+3
5.273E+2	1.002E+4
4.997E+2	1.041E+4
4.761E+2	1.042E+4
4.557E+2	1.061E+4
4.334E+2	1.115E+4
[illegible]	1.243E+4
3.995E+2	1.325E+4
3.843E+2	1.442E+4
3.710E+2	1.585E+4
3.504E+2	1.655E+4
3.442E+2	1.695E+4
3.317E+2	1.715E+4
[illegible]	[illegible]
3.102E+2	1.944E+4
3.024E+2	1.932E+4
[illegible]	1.879E+4
2.930E+2	1.837E+4
2.857E+2	1.559E+4
2.778E+2	[illegible]

ν	α
DATA SET 42	
T = 673.0	
6.005E+2	4.156E+3
[illegible]	7.176E+3
5.533E+2	8.309E+3
5.547E+2	[illegible]
5.242E+2	8.372E+3
4.997E+2	[illegible]
4.761E+2	8.932E+3
4.534E+2	9.299E+3
4.334E+2	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
3.543E+2	[illegible]
3.714E+2	[illegible]
3.504E+2	[illegible]
3.435E+2	1.337E+4
[illegible]	[illegible]
3.222E+2	1.359E+4
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	1.137E+4
2.856E+2	[illegible]
2.773E+2	9.567E+3
DATA SET 43	
T = 293.0	
1.477E+2	2.543E+2
1.312E+2	2.292E+2
1.230E+2	2.129E+2
[illegible]	[illegible]
[illegible]	1.919E+2
[illegible]	[illegible]
[illegible]	1.631E+2
9.524E+1	1.643E+2
8.929E+1	1.492E+2
[illegible]	1.333E+2
7.813E+1	1.227E+2
[illegible]	7.159E+1
6.579E+1	4.588E+1

TABLE 4. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence) (continued)

DATA SET 43(CONT.)

ν	α
6.833E+1	4.535E+1
6.024E+1	3.447E+1
5.435E+1	3.162E+1
4.762E+1	2.289E+1
4.274E+1	1.061E+1
3.803E+1	7.571E+0
3.395E+1	5.015E+0
3.044E+1	4.510E+0
2.257E+1	4.026E+0
2.841E+1	3.741E+0
3.531E+1	3.625E+0
3.115E+1	3.503E+0
2.770E+1	3.425E+0
2.646E+1	[illegible]
2.571E+1	3.747E+0
2.462E+1	4.077E+0
2.353E+1	3.371E+0
2.217E+1	3.222E+0
2.123E+1	2.955E+0
2.032E+1	2.552E+0
2.062E+1	2.454E+0
2.000E+1	2.554E+0
1.972E+1	2.702E+0
1.942E+1	2.702E+0
1.887E+1	2.822E+0
1.802E+1	2.624E+0
1.778E+1	2.710E+0
1.727E+1	2.471E+0
1.707E+1	2.322E+0
1.675E+1	2.147E+0
1.540E+1	2.025E+0
1.534E+1	2.197E+0
1.499E+1	2.319E+0
1.445E+1	2.151E+0
1.342E+1	2.159E+0
1.304E+1	2.032E+0
1.266E+1	1.751E+0
1.193E+1	1.754E+0
1.175E+1	1.801E+0
1.157E+1	2.240E+0

DATA SET 43(CONT.)

ν	α
1.124E+1	2.273E+0
1.091E+1	2.110E+0
1.044E+1	2.112E+0
1.023E+1	1.900E+0
1.000E+1	1.784E+0
9.524E+0	1.424E+0
9.703E+0	1.350E+0
9.174E+0	1.234E+0
9.009E+0	1.143E+0
8.021E+0	6.067E-1

DATA SET 44
T = 300.0

ν	α
4.310E+2	1.202E+4
4.105E+2	1.399E+4
3.831E+2	1.574E+4
3.602E+2	1.749E+4
3.536E+2	1.919E+4
3.472E+2	2.247E+4
3.373E+2	2.441E+4
3.311E+2	2.321E+4
3.205E+2	3.097E+4
3.135E+2	3.473E+4
3.106E+2	3.481E+4
3.080E+2	3.323E+4
3.054E+2	3.034E+4
3.030E+2	2.490E+4
3.012E+2	2.023E+4
2.950E+2	1.512E+4
2.857E+2	7.693E+3
2.717E+2	4.883E+3
2.639E+2	3.579E+3

DATA SET 45
T = 700.0

ν	α
3.571E+2	1.710E+4
3.509E+2	1.983E+4
3.448E+2	2.279E+4

DATA SET 45(CONT.)

ν	α
3.378E+2	2.420E+4
3.333E+2	2.589E+4
3.279E+2	2.812E+4
3.236E+2	3.273E+4
3.165E+2	3.845E+4
3.115E+2	3.699E+4
3.077E+2	2.417E+4
3.030E+2	1.359E+4
2.994E+2	1.035E+4
2.941E+2	6.948E+3
2.907E+2	4.420E+3
2.865E+2	2.845E+3
2.786E+2	1.120E+3
2.710E+2	5.449E+2

DATA SET 46
T = [illegible]

ν	α
3.623E+2	1.598E+4
3.559E+2	1.693E+4
3.437E+2	1.784E+4
3.436E+2	1.969E+4
3.390E+2	2.258E+4
3.322E+2	2.405E+4
3.279E+2	2.600E+4
3.225E+2	2.911E+4
3.155E+2	3.426E+4
3.135E+2	3.549E+4
3.077E+2	3.028E+4
3.030E+2	1.940E+4
2.975E+2	1.447E+4
2.933E+2	8.127E+3
2.899E+2	5.699E+3
2.865E+2	3.781E+3
2.774E+2	1.955E+3
2.710E+2	1.153E+3
2.632E+2	7.937E+2

DATA SET 47
T = 300.0

ν	α
3.636E+2	1.608E+4
3.571E+2	1.795E+4
3.509E+2	1.922E+4
3.450E+2	2.076E+4
3.390E+2	2.326E+4
3.344E+2	2.569E+4
3.279E+2	2.752E+4
3.226E+2	3.032E+4
3.185E+2	3.054E+4
3.125E+2	3.444E+4
3.077E+2	3.209E+4
3.040E+2	2.036E+4
2.985E+2	1.962E+4
2.950E+2	1.431E+4
2.899E+2	8.008E+3
2.857E+2	5.062E+3
2.786E+2	2.095E+3
2.710E+2	1.703E+3
2.632E+2	1.157E+3

DATA SET 48
T = 298.0

ν	α
3.334E+1	5.153E+0
2.825E+1	3.430E+0
2.223E+1	1.965E+0
1.450E+1	7.069E-1
1.076E+1	4.074E-1

DATA SET 49
T = 298.5

ν	α
9.120E+4	5.570E-1
9.220E+4	5.840E-1
9.320E+4	7.310E-1
9.380E+4	1.040E+0
9.440E+4	1.760E+0
9.500E+4	4.490E+0
9.550E+4	9.790E+0

DATA SET 49(CONT.)

ν	α
9.580E+4	1.250E+1
9.610E+4	3.470E+1
9.650E+4	4.430E+1
9.660E+4	1.120E+2
9.690E+4	1.820E+2
9.700E+4	2.320E+2
9.750E+4	5.050E+2

DATA SET 50
T = 437.0

ν	α
8.600E+4	3.610E-1
8.720E+4	3.600E-1
8.860E+4	5.640E-1
8.940E+4	6.110E-1
9.000E+4	8.100E-1
9.040E+4	9.900E-1
9.050E+4	1.140E+0
9.060E+4	1.320E+0
9.130E+4	2.480E+0
9.170E+4	4.650E+0
9.220E+4	1.610E+1
9.260E+4	1.990E+1
9.280E+4	2.790E+1
9.320E+4	5.240E+1
9.340E+4	8.100E+1
9.380E+4	1.520E+2
9.420E+4	2.850E+2
9.440E+4	4.030E+2

DATA SET 51
T = 510.0

ν	α
8.500E+4	3.990E-1
8.600E+4	3.980E-1
8.720E+4	4.820E-1
8.820E+4	6.750E-1
8.890E+4	1.270E+0
8.940E+4	2.620E+0
9.000E+4	5.150E+0

DATA SET 51(CONT.)

ν	α
9.030E+4	7.950E+0
9.050E+4	1.120E+1
9.070E+4	1.730E+1
9.130E+4	2.800E+1
9.170E+4	5.010E+1
9.210E+4	1.140E+2
9.260E+4	2.040E+2
9.280E+4	3.150E+2
9.320E+4	5.630E+2

DATA SET 52
T = 573.0

ν	α
8.500E+4	4.650E-1
8.600E+4	6.220E-1
8.720E+4	1.050E+0
8.800E+4	3.940E+0
8.840E+4	1.040E+1
8.930E+4	2.160E+1
9.020E+4	[illegible]
9.060E+4	9.730E+1
9.130E+4	2.350E+2
9.170E+4	4.420E+2

DATA SET 53
T = 300.0

ν	α
9.710E+4	2.140E+2
9.650E+4	1.170E+2
9.630E+4	3.540E+1
9.580E+4	1.350E+1
9.510E+4	4.340E+0
9.470E+4	3.080E+0
9.410E+4	2.610E+0
9.390E+4	2.010E+0
9.340E+4	1.920E+0
9.280E+4	1.840E+0
9.210E+4	1.920E+0
9.140E+4	1.700E+0
9.010E+4	1.760E+0

TABLE 4. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Wavenumber Dependence) (continued)

ν	α	ν	α	ν	α
DATA SET 53(CONT.)		DATA SET 53(CONT.)		DATA SET 54 T = 300.0	
8.970E+4	1.340E+0	6.720E+4	5.320E-1		
8.950E+4	1.690E+0	6.680E+4	4.670E-1	7.950E+4	6.940E-1
8.920E+4	1.590E+0	6.650E+4	4.490E-1	8.070E+4	7.560E-1
8.910E+4	1.600E+0	6.640E+4	4.850E-1	8.140E+4	7.560E-1
8.940E+4	1.550E+0	6.590E+4	4.110E-1	8.240E+4	7.890E-1
8.800E+4	1.550E+0	6.560E+4	3.770E-1	8.400E+4	8.240E-1
8.740E+4	1.550E+0	6.520E+4	2.800E-1	8.520E+4	8.600E-1
8.710E+4	1.550E+0	6.480E+4	3.320E-1	8.610E+4	8.500E-1
8.620E+4	1.550E+0	6.470E+4	2.920E-1	8.730E+4	8.600E-1
8.590E+4	1.550E+0	6.410E+4	2.570E-1	8.900E+4	8.610E-1
8.540E+4	1.430E+0	6.380E+4	2.570E-1	8.970E+4	9.370E-1
8.520E+4	1.490E+0	6.360E+4	2.360E-1	9.040E+4	9.370E-1
8.490E+4	1.360E+0	6.350E+4	2.160E-1	9.140E+4	9.370E-1
8.410E+4	1.420E+0	6.310E+4	1.670E-1	9.220E+4	9.790E-1
8.350E+4	1.490E+0	6.230E+4	1.960E-1	9.260E+4	1.020E+0
8.300E+4	1.400E+0	6.290E+4	1.900E-1	9.330E+4	1.160E+0
8.240E+4	1.470E+0	6.260E+4	1.330E-1	9.350E+4	1.440E+0
8.140E+4	1.420E+0	6.250E+4	1.900E-1	9.450E+4	2.030E+0
8.070E+4	1.350E+0	6.250E+4	1.900E-1	9.470E+4	2.630E+0
8.020E+4	1.300E+0	6.260E+4	1.900E-1	9.500E+4	5.020E+0
7.960E+4	1.350E+0	6.240E+4	1.670E-1	9.560E+4	8.420E+0
7.890E+4	1.310E+0	6.220E+4	1.750E-1	9.760E+4	5.240E+2
7.800E+4	1.350E+0	6.220E+4	1.530E-1		
7.770E+4	1.250E+0	6.190E+4	1.300E-1		
7.700E+4	1.250E+0	6.170E+4	1.070E-1		
7.620E+4	1.150E+0	6.140E+4	1.530E-1		
7.560E+4	1.100E+0	6.120E+4	1.410E-1		
7.500E+4	1.080E+0	6.110E+4	1.070E-1		
7.430E+4	1.010E+0	6.080E+4	1.750E-1		
7.400E+4	1.010E+0	6.040E+4	1.750E-1		
7.330E+4	9.600E-1	5.950E+4	1.750E-1		
7.260E+4	9.250E-1	5.880E+4	1.410E-1		
7.190E+4	1.060E+0	5.830E+4	1.190E-1		
7.130E+4	8.510E-1	5.740E+4	1.240E-1		
7.070E+4	8.160E-1	5.690E+4	1.240E-1		
6.990E+4	7.320E-1	5.620E+4	1.040E-1		
6.950E+4	7.320E-1	5.550E+4	1.040E-1		
6.930E+4	7.170E-1	5.500E+4	1.240E-1		
6.840E+4	6.590E-1	5.320E+4	1.090E-1		
6.810E+4	6.040E-2	5.260E+4	1.090E-1		

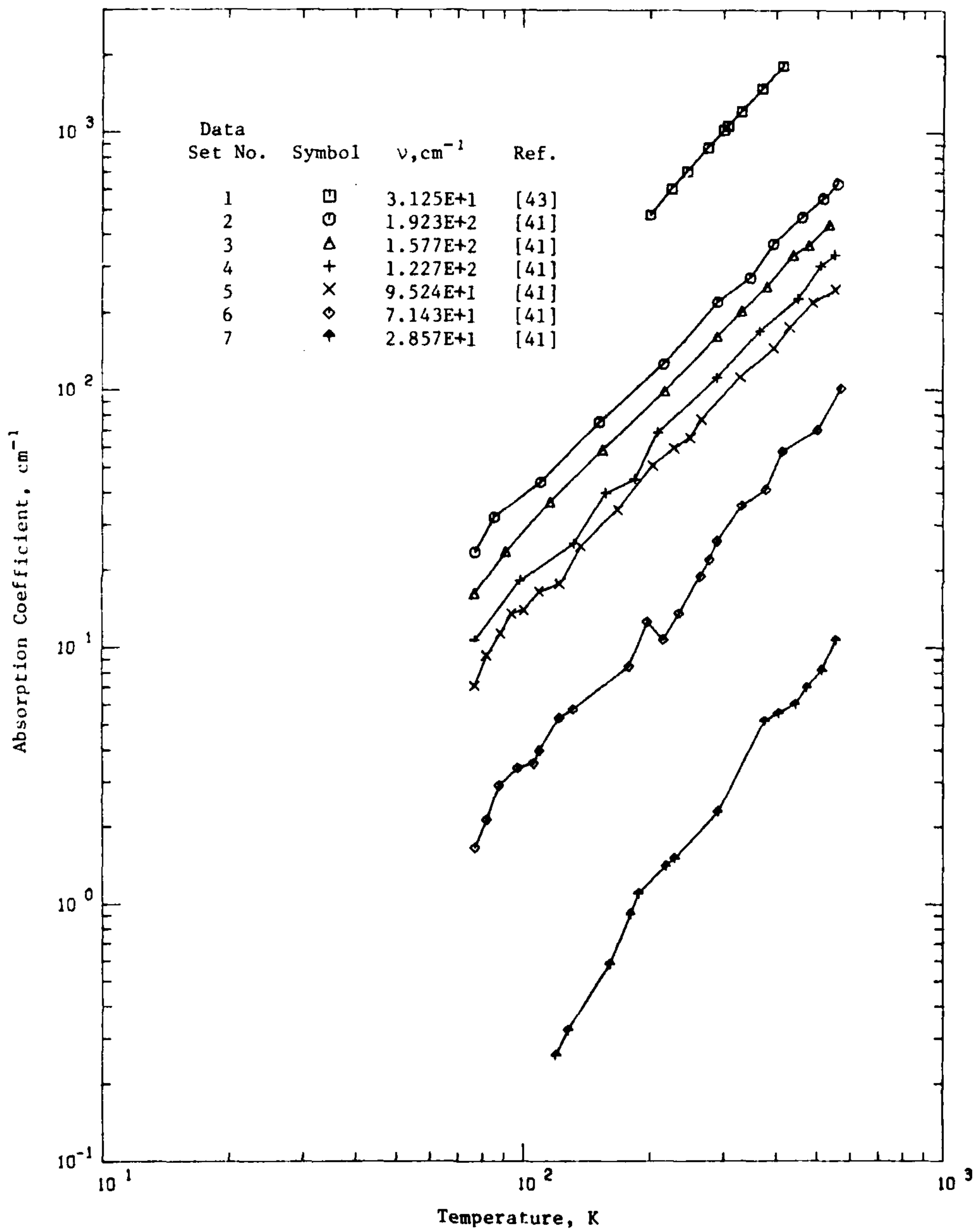

Figure 6. Absorption Coefficient of Lithium Fluoride (Temperature Dependence)

TABLE 5. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Temperature Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	43	Stolen, R. and Dransfeld, K.	1965	T	31.25	2-413	Single crystals; obtained from the Harshaw Chemical Co. and Isomet Corp.; cylindrical specimen of diameter 2.5 cm, and of varying thickness between 0.1 and 2.5 cm; absorption coefficients directly determined; data extracted from a figure.
2	41	Klier, M.	1958	Z	192.3	77-561	Crystal; plate specimen; absorption coefficients deduced from transmittance measurements and estimated reflectivity; reflectivity estimated by assuming n = 3.07 for the wavelength and in the entire temperature range; data extracted from a figure; estimated uncertainty about 5 to 10%.
3	41	Klier, M.	1958	Z	157.7	77-536	Same as above.
4	41	Klier, M.	1958	Z	122.7	77-552	Same as above.
5	41	Klier, M.	1958	Z	95.24	77-553	Same as above.
6	41	Klier, M.	1958	Z	71.43	77-571	Same as above.
7	41	Klier, M.	1958	Z	28.57	120-555	Same as above.

TABLE 6. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE (Temperature Dependence)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

T	α
DATA SET 1	
ν = 3.125E+1	
231.6	4.794E+2
226.0	6.040E+2
246.0	7.065E+2
275.0	4.745E+2
304.0	1.020E+3
317.0	1.152E+3
331.0	1.219E+3
369.0	1.433E+3
413.0	1.915E+3
DATA SET 2	
ν = 1.923E+2	
76.9	2.347E+1
85.5	3.217E+1
110.2	4.335E+1
152.4	7.504E+1
216.3	1.251E+2
251.1	2.139E+2
347.5	2.715E+2
394.5	3.032E+2
461.3	4.093E+2
517.6	5.323E+2
551.0	6.327E+2
DATA SET 3	
ν = 1.577E+2	
75.9	1.025E+1
92.8	2.361E+1
116.1	3.075E+1
155.2	5.849E+1
217.3	9.314E+1
249.7	1.511E+2
331.9	2.024E+2
386.2	2.518E+2
439.5	3.343E+2
479.7	3.640E+2
535.8	4.387E+2
DATA SET 4	
ν = 1.227E+2	
76.9	1.067E+1
93.0	1.824E+1
132.4	2.530E+1
157.4	3.490E+1
184.5	4.529E+1
229.4	6.355E+1
289.7	1.114E+2
366.4	1.591E+2
451.9	2.265E+2
510.5	3.034E+2
552.0	3.350E+2
DATA SET 5	
ν = 9.524E+1	
76.9	7.085E+0
82.2	9.311E+0
88.5	1.135E+1
94.0	1.355E+1
100.7	1.399E+1
109.6	1.648E+1
122.7	1.770E+1
137.4	2.467E+1
167.9	3.443E+1
203.7	5.094E+1
224.0	5.950E+1
249.5	6.530E+1
265.5	7.692E+1
328.9	1.122E+2
394.5	1.452E+2
431.5	1.750E+2
490.9	2.183E+2
553.4	2.455E+2
DATA SET 6	
ν = 7.143E+1	
76.9	1.651E+0
82.2	2.130E+0
DATA SET 6(CONT.)	
87.7	2.899E+0
97.3	3.393E+0
106.2	3.537E+0
109.6	3.967E+0
122.2	5.314E+0
132.1	5.727E+0
179.1	8.419E+0
197.7	1.257E+1
215.8	1.174E+1
235.0	1.359E+1
263.6	1.889E+1
276.7	2.193E+1
289.1	2.595E+1
330.4	3.549E+1
377.6	4.103E+1
414.0	5.782E+1
501.2	6.999E+1
571.5	1.016E+2
DATA SET 7	
ν = 2.857E+1	
119.9	2.585E-1
128.5	3.231E-1
161.4	5.852E-1
180.7	9.155E-1
199.5	1.099E+0
218.8	1.407E+0
229.6	1.501E+0
291.7	2.291E+0
375.8	5.188E+0
405.5	5.547E+0
444.6	6.014E+0
473.2	7.001E+0
515.2	8.150E+0
554.6	1.070E+1

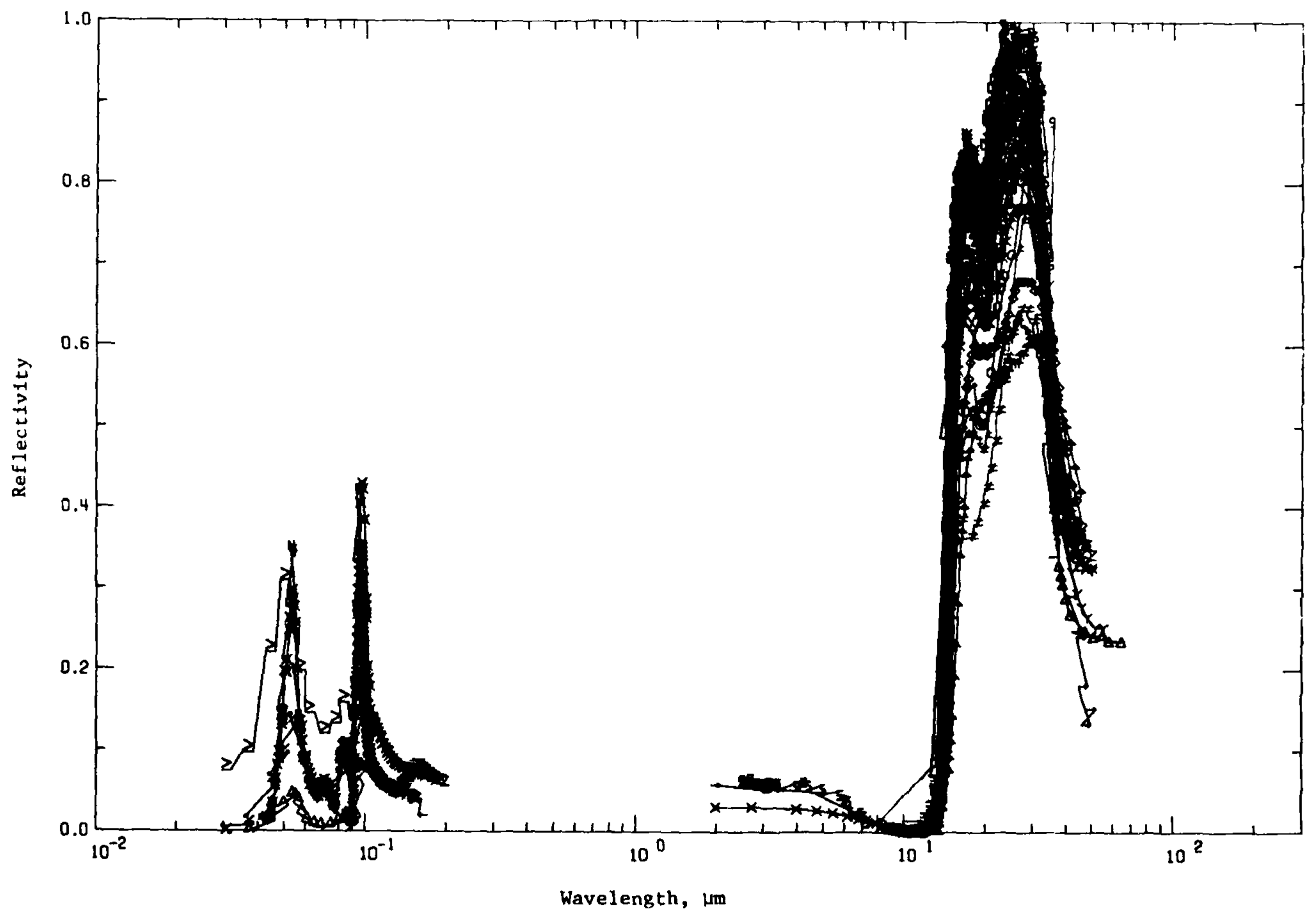

Figure 7. Reflectivity of Lithium Fluoride

TABLE 7. SUMMARY OF MEASUREMENTS ON THE REFLECTIVITY OF LITHIUM FLUORIDE

Data Set No	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, µm	Temperature, K	Specifications and Remarks
1	22	Jasperse, J.R., Kahan, A., Plendl, J.N., and Mitra, S.S.	1966	R	12.5-40.0	7.5	High purity; single crystal; hand polished until optically flat to about 1/2 wavelength of the mean sodium D lines; annealed in a vacuum furnace for 2 days at a temperature of about 3/4 of the melting temperature of the crystal; near normal reflectivity determined with aluminized mirror reference; reflectivity data checked several times for different samples and for several cycles of heating and cooling and reproduced to within ±1 to ±2%; data extracted from a figure.
2	22	Jasperse, J.R. et al.	1966	R	12.5-44.0	85	Same as above.
3	22	Jasperse, J.R. et al.	1966	R	12.8-45.3	295	Same as above except sample temperatures measured with chrome-alumel thermocouple accurate to within ±2% of the absolute value.
4	22	Jasperse, J.R. et al.	1966	R	14.2-46.0	420	Same as above.
5	22	Jasperse, J.R. et al.	1966	R	13.9-45.3	605	Same as above.
6	22	Jasperse, J.R. et al.	1966	R	13.4-46.0	840	Same as above except sample temperatures measured with an optical pyrometer accurate to within ±2% of the absolute value.
7	22	Jasperse, J.R. et al.	1966	R	13.9-45.3	1060	Same as above.
8	34	Kato, R.	1961	R	0.086-50.183	283	High purity; single crystal; freshly cleaved specimens; near normal (15° incident angle) reflectivities determined from the intensity ratios of the reflected light to the incident light; uncertainties in the reflectivities about 5% in the wavelength region below 0.095 µm and about 1% above 0.095 µm; data extracted from a figure.
9	34	Kato, R.	1961	R	0.087-0.198	283	Same as above except the crystal grown in air in order to see the effects of hydrolysis on the reflectivities.
10	29	Hohls, H.W.	1936	R	12.0-55.4	293	Crystal; grown by the Kyropoulos method; specimen configuration and surface condition unspecified; normal reflectivity determined by using a freshly vacuum coated silver mirror as reference standard; data extracted from a figure; estimated uncertainty about ±10%; temperature was not given, 293 K assumed.
11	35	Roessler, D.M. and Walker, W.C.	1967	R	0.045-0.105	300	Single crystal; obtained from the Harshaw Chemical Co.; specimens cleaved in air and exposed to low humidity atmosphere for about 2 minutes before transferred to vacuum system of reflectometer; near normal reflectivities obtained over a long period of measurements; no contamination from the use of an oil diffusion pump and no damage due to operations of radiation source observed; data extracted from a figure; estimated uncertainty about 5%.
12	41	Klier, M.	1958	R	13.4-26.0	77	Crystal; specimen with top surface highly polished; reflection spectrum measured and determined with respect to a reference mirror made of German V_2A steel; data extracted from a figure.
13	41	Klier, M.	1958	R	13.5-25.0	293	Same as above.

TABLE 7. SUMMARY OF MEASUREMENTS ON THE REFLECTIVITY OF LITHIUM FLUORIDE (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
14	41	Klier, M.	1958	R	14-25.4	573	Same as above.
15	51	Gottlieb, M.	1960	R	14.5-36.0	300	Li^7F crystals obtained by reaction of Li (97.7% pure Li^7), H_2O and HF; vacuum evaporated film (10 μm thick) onto a natural crystal of LiF; heated to 523 K then cooled; data extracted from a figure.
16	51	Gottlieb, M.	1960	R	14.5-36.0	300	Same as above except material obtained from a chemical reactor of $LiCO_2$ (99.9% pure Li^6) with HF.
17	52	Johnson, B.K.	1941	R	0.134-0.164	298	Single crystal; polished surface; back surface ground; measurements made in vacuum; data extracted from a table.
18	53	Sulzbach, F. and Turner, A.F.	1966	R	8.0-36.9	298	Thin film; evaporated in vacuum onto a glass substrate at 523 K; reflectivity measurements made at 298 K using spectrophotometer; data extracted from a figure.
19	53	Sulzbach, F. and Turner, A.F.	1966	R	10.9-36.9	298	Same as above except film was deposited onto glass at 423 K.
20	53	Sulzbach, F. and Turner, A.F.	1966	R	10.6-34.5	298	Crystal; polished surface; data extracted from a figure.
21	54	McCarthy, D.E.	1963	R	2.0-50.0	298	Synthetic crystal; 5 mm thick; polished to flatness of seven fringes on both sides; 30° *reflectivity* measured; aluminum mirror reference standard; data extracted from a curve.
22	55	Stephan, G., Lemonnier, J., and Robin, G.	1967	R	0.0306-0.103	298	Cleaved; 20° spectral reflectivity measured in vacuum; data extracted from a figure.
23	55	Stephan, G. et al.	1967	R	0.0306-0.103	298	Same as above except for 60° reflectivity.
24	55	Stephan, G. et al.	1967	R	0.37-0.10	298	Polished; 20° reflectivity measured in vacuum; data extracted from a curve.
25	56	Martin, T.P. and Turner, A.F.	1966	R	14.5-28.1	298	Thin film evaporated onto glass substrate in vacuum; temperature of substrate 308 K; near normal reflectivity measured; data extracted from a curve.
26	56	Martin, T.P. and Turner, A.F.	1966	R	14.6-36.0	298	Same as above except substrate temperature 373 K.
27	56	Martin, T.P. and Turner, A.F.	1966	R	14.4-36.0	298	Same as above except substrate temperature 423 K.
28	56	Martin, T.P. and Turner, A.F.	1966	R	14.5-36.0	298	Same as above except substrate temperature 523 K.
29	56	Martin, T.P. and Turner, A.F.	1966	R	16.9-36.0	298	Same as above except substrate temperature 573 K.

TABLE 7. SUMMARY OF MEASUREMENTS ON THE REFLECTIVITY OF LITHIUM FLUORIDE (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
30	56	Martin, T.P. and Turner, A.F.	1966	R	13.7-35.7	298	Single crystal; normal reflectivity measured; data extracted from a figure.
31	57	Rao, K.K., Moravec, T.J., Rife, J.C., and Dexter, R.N.	1975	R	0.041-0.104	100	Single crystal; obtained from the Harshaw Chemical Co.; cleaved specimen of 1 cm diameter and 3 mm thick; specimen kept in vacuum during measurements; near normal reflectivity obtained; data extracted from a curve.
32	58	Schaefer, J.C. and Hill, E.R.	1965	R	2.5-34.8	300	Single crystal from the Harshaw Chemical Co.; geometry not specified; General Electric and Perkin Elmer spectrophotometers used; data extracted from smooth curve.
33	59	Gottlieb, M.	1960	R	15.9-34.7	135	Single crystal from Harshaw Chemical Co.; polished with water compound, normal reflectance measured in vacuum with aluminum mirror reference standard; data extracted from a curve.
34	59	Gottlieb, M.	1960	R	16.5-29.7	210	Same as above.
35	59	Gottlieb, M.	1960	R	11.14-64.11	300	Same as above.
36	59	Gottlieb, M.	1960	R	16.5-28.3	355	Same as above.
37	59	Gottlieb, M.	1960	R	2.0-14.1	300	Same as above.
38	60	Turner, A.F., Chang, L., and Martin, T.R.	1965	R	14-39	293	Polished single crystal; near normal reflectivity measured with aluminum mirror for reference; data extracted from a figure.
39	61	Nakagawa, I.	1971	R	14.7-47.7	293	Single crystal; near normal reflectivity measurements made in a vacuum; data extracted from a curve.
40	37	Tomiki, T. and Miyata, T.	1969	R	0.095-50.155	293	Single crystal; obtained from the Harshaw Chemical Co.; freshly cleaved; normal reflectivity measured in vacuum; data extracted from a curve.
41	40	Machare, A., Soriaga, M.P., and Andermann, G.	1974	R	8.69-50.0	300	Single crystal; well polished and carefully annealed specimens; near normal reflectivity obtained; in the long-wavelength-shoulder region, random error about 2-2.5%; in the high reflectance region, random error about 0.5%; in the low-wavelength-shoulder, random error about 1.5%; data extracted from a table.
42	40	Machare, A. et al.	1974	R	8.69-50.0	80	Same as above.
43	40	Machare, A. et al.	1974	R	8.69-50.0	20	Same as above.

TABLE 8. EXPERIMENTAL DATA ON THE REFLECTIVITY OF LITHIUM FLUORIDE

[Wavelength, λ, μm; Temperature, T, K; Reflectivity, ρ]

DATA SET 1
T = 7.5

λ	ρ
12.50	0.01
13.33	0.03
13.53	0.04
13.71	0.06
13.91	0.09
14.08	0.13
14.28	0.19
14.51	0.28
14.64	0.43
14.79	0.61
15.01	0.71
15.35	0.77
15.60	0.79
15.84	0.81
16.12	0.81
16.35	0.82
16.63	0.83
16.92	0.82
17.22	0.82
17.51	0.81
17.79	0.81
18.14	0.80
18.48	0.73
18.83	0.73
19.55	0.84
19.92	0.85
20.32	0.89
20.74	0.90
21.18	0.92
21.64	0.93
22.12	0.94
22.57	0.95
23.14	0.95
23.54	0.95
24.27	0.97
24.47	0.97
25.01	0.97
26.24	0.98
26.95	0.98

DATA SET 1 (CONT.)

λ	ρ
27.62	0.98
28.40	0.97
29.23	0.95
30.12	0.89
31.05	0.80
32.05	0.69
33.22	0.60
34.30	0.52
35.58	0.47
36.90	0.43
38.31	0.40
39.08	0.39

DATA SET 2
T = 85.0

λ	ρ
12.50	0.02
13.31	0.03
13.49	0.03
13.60	0.04
13.88	0.08
14.06	0.12
14.26	0.17
14.47	0.23
14.79	0.52
15.03	0.67
15.30	0.73
15.60	0.76
15.84	0.78
16.12	0.80
16.39	0.81
16.60	0.82
16.94	0.81
17.24	0.81
17.54	0.80
17.85	0.80
18.18	0.80
18.51	0.79
18.80	0.77
19.23	0.75

DATA SET 2 (CONT.)

λ	ρ
19.64	0.76
20.00	0.80
20.40	0.83
20.83	0.86
21.27	0.88
21.73	0.90
22.22	0.91
22.72	0.92
23.25	0.93
23.86	0.94
24.50	0.94
25.06	0.95
25.70	0.95
26.38	0.95
27.10	0.95
27.85	0.95
28.65	0.95
29.58	0.93
30.48	0.90
31.44	0.82
32.36	0.72
33.55	0.61
34.60	0.53
35.97	0.47
37.31	0.44
38.61	0.41
40.32	0.38
42.01	0.36
43.85	0.34

DATA SET 3
T = 295.0

λ	ρ
12.82	0.01
13.33	0.02
13.53	0.03
13.71	0.04
13.88	0.07
14.08	0.12
14.33	0.17

DATA SET 3 (CONT.)

λ	ρ
14.49	0.22
14.72	0.31
14.94	0.44
15.15	0.55
15.38	0.65
15.60	0.69
15.84	0.72
16.10	0.74
16.36	0.76
16.66	0.76
16.94	0.76
17.21	0.76
17.51	0.76
17.82	0.75
18.14	0.74
18.48	0.73
18.83	0.72
19.15	0.70
19.56	0.69
19.96	0.69
20.32	0.70
20.79	0.75
21.14	0.78
21.69	0.80
22.12	0.83
22.67	0.86
23.14	0.87
23.69	0.87
24.27	0.88
24.87	0.89
25.57	0.90
26.17	0.90
26.88	0.90
27.62	0.90
28.40	0.89
29.23	0.89
30.12	0.89
31.05	0.85
32.05	0.81
33.22	0.71
34.24	0.57
35.58	0.52
36.90	0.47
38.46	0.43
39.84	0.40
41.49	0.37
43.29	0.35
45.24	0.33

DATA SET 4
T = 420.0

λ	ρ
14.26	0.16
14.49	0.21
14.70	0.35
14.92	0.41
15.12	0.51
15.36	0.59
15.60	0.64
15.84	0.68
16.10	0.70
16.39	0.71
16.66	0.72
16.94	0.72
17.24	0.72
17.54	0.71
17.85	0.71
18.18	0.70
18.55	0.69
18.86	0.68
19.23	0.67
19.60	0.65
20.00	0.65
20.40	0.66
20.83	0.68
21.27	0.71
21.69	0.74
22.22	0.76
22.72	0.79
23.31	0.80

DATA SET 4 (CONT.)

λ	ρ
23.80	0.82
24.44	0.84
25.10	0.84
25.71	0.85
26.45	0.85
27.16	0.84
27.93	0.84
28.65	0.83
29.49	0.83
30.45	0.82
31.34	0.81
32.46	0.77
33.55	0.69
34.72	0.60
35.97	0.52
37.31	0.48
38.91	0.44
40.32	0.40
42.01	0.37
44.05	0.35
45.97	0.34

DATA SET 5
T = 605.0

λ	ρ
13.89	0.05
14.08	0.08
14.28	0.12
14.49	0.14
14.70	0.19
14.92	0.27
15.15	0.36
15.39	0.46
15.62	0.52
15.84	0.57
16.10	0.60
16.36	0.63
16.63	0.64
16.94	0.65
17.24	0.66

TABLE 8. EXPERIMENTAL DATA ON THE REFLECTIVITY OF LITHIUM FLUORIDE (continued)

DATA SET 5 (CONT.)

λ	ρ
17.54	0.65
17.82	0.65
18.19	0.66
18.51	0.65
18.83	0.65
19.19	0.64
19.55	0.63
19.95	0.63
20.36	0.63
20.79	0.63
21.23	0.64
21.69	0.64
22.12	0.67
22.67	0.69
23.26	0.71
23.83	0.73
24.33	0.75
24.87	0.76
25.57	0.77
26.24	0.77
26.95	0.77
27.62	0.77
28.40	0.77
29.23	0.77
30.12	0.75
31.05	0.75
32.15	0.73
33.22	0.71
34.24	0.65
35.53	0.59
36.92	0.53
38.31	0.48
39.84	0.44
41.49	0.41
43.29	0.38
45.24	0.36

DATA SET 6
T = 840.0

λ	ρ
13.49	0.02
13.86	0.04
14.06	0.06
14.28	0.08
14.47	0.10
14.70	0.12
14.93	0.16
15.15	0.23
15.38	0.29
15.62	0.36
15.87	0.41
16.12	0.47
16.39	0.50
16.66	0.53
16.94	0.55
17.27	0.56
17.57	0.58
17.85	0.59
18.18	0.60
18.55	0.59
18.93	0.59
19.26	0.59
19.66	0.60
20.04	0.59
20.44	0.59
20.87	0.60
21.27	0.60
21.73	0.60
22.27	0.61
22.77	0.61
23.31	0.62
23.93	0.63
24.50	0.64
25.12	0.66
25.73	0.67
26.45	0.68
27.17	0.68
27.93	0.68
28.73	0.68

DATA SET 6 (CONT.)

λ	ρ
29.49	0.68
30.48	0.67
31.54	0.67
32.46	0.65
33.55	0.64
34.84	0.62
35.97	0.58
37.31	0.55
38.75	0.51
40.32	0.47
42.01	0.43
43.85	0.41
45.87	0.38

DATA SET 7
T = 1060.0

λ	ρ
13.92	0.04
14.30	0.6
14.74	0.09
14.97	0.11
15.17	0.14
15.43	0.19
15.64	0.23
15.89	0.28
16.12	0.34
16.42	0.37
16.69	0.40
16.97	0.44
17.24	0.46
17.57	0.47
17.85	0.49
18.14	0.51
18.51	0.52
18.86	0.52
19.23	0.53
19.60	0.53
20.00	0.54
20.40	0.54
20.83	0.55

DATA SET 7 (CONT.)

λ	ρ
21.23	0.55
21.73	0.55
22.17	0.56
22.72	0.56
23.25	0.57
23.75	0.57
24.33	0.57
24.87	0.58
25.57	0.58
26.31	0.58
26.95	0.59
27.70	0.59
28.49	0.60
29.32	0.61
30.21	0.61
31.15	0.60
32.25	0.60
33.22	0.59
34.36	0.58
35.58	0.56
36.90	0.54
38.46	0.52
39.84	0.50
41.32	0.48
43.29	0.45
45.24	0.42

DATA SET 8
T = 283.0

λ	ρ
0.0861	0.020
0.0872	0.020
0.0885	0.020
0.0898	0.017
0.0906	0.017
0.0913	0.050
0.0918	0.088
0.0926	0.142
0.0930	0.181
0.0936	0.237

DATA SET 8 (CONT.)

λ	ρ
0.0947	0.238
0.0949	0.320
0.0953	0.338
0.0958	0.349
0.0963	0.347
0.0968	0.352
0.0973	0.349
0.0977	0.344
0.0981	0.329
0.0984	0.312
0.0984	0.293
0.0989	0.255
0.0994	0.223
0.0998	0.202
0.1004	0.192
0.1009	0.167
0.1015	0.153
0.1023	0.137
0.1028	0.130
0.1035	0.125
0.1040	0.119
0.1050	0.124
0.1055	0.132
0.1064	0.139
0.1069	0.141
0.1073	0.137
0.1077	0.139
0.1088	0.134
0.1094	0.132
0.1109	0.127
0.1117	0.127
0.1127	0.122
0.1138	0.115
0.1147	0.117
0.1156	0.114
0.1165	0.108
0.1178	0.108
0.1195	0.102
0.1203	0.102
0.1214	0.096

DATA SET 8 (CONT.)

λ	ρ
0.1227	0.099
0.1238	0.093
0.1258	0.093
0.1275	0.089
0.1287	0.085
0.1303	0.083
0.1322	0.083
0.1347	0.080
0.1374	0.079
0.1401	0.079
0.1440	0.077
0.1479	0.075
0.1514	0.075
0.1550	0.072
0.1585	0.071
0.1627	0.070
0.1677	0.068
0.1776	0.066
0.1826	0.063

DATA SET 9
T = 283.0

λ	ρ
0.0870	0.017
0.0881	0.014
0.0886	0.006
0.0897	0.013
0.0899	0.021
0.0901	0.030
0.0911	0.075
0.0911	0.084
0.0915	0.114
0.0920	0.149
0.0926	0.163
0.0926	0.173
0.0930	0.193
0.0930	0.195
0.0935	0.224
0.0941	0.257
0.0945	0.275

TABLE 8. EXPERIMENTAL DATA ON THE REFLECTIVITY OF LITHIUM FLUORIDE (continued)

λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ
DATA SET 9(CONT.)		DATA SET 9(CONT.)		DATA SET 10(CONT.)		DATA SET 10(CONT.)		DATA SET 11(CONT.)		DATA SET 11(CONT.)	
0.0945	0.272	0.1289	0.049	12.50	0.0179	46.02	0.278	0.0645	0.052	0.0995	0.354
0.0952	0.278	0.1301	0.049	12.88	0.0270	48.19	0.265	0.0657	0.050	0.1021	0.287
0.0955	0.284	0.1316	0.050	13.18	0.0429	51.46	0.252	0.0668	0.046	0.1011	0.278
0.0961	0.281	0.1330	0.051	13.45	0.0619	55.33	0.252	0.0676	0.043	0.1011	0.269
0.0965	0.253	0.1342	0.054	13.74	0.0920			0.0683	0.049	0.1011	0.263
0.0972	0.252	0.1355	0.055	14.02	0.134	DATA SET 11		0.0691	0.054	0.1025	0.204
0.0974	0.235	0.1379	0.059	14.19	0.175	T = 300.0		0.0703	0.055	0.1032	0.189
0.0983	0.228	0.1388	0.061	14.32	0.237			0.0702	0.060	0.1045	0.179
0.0994	0.190	0.1402	0.061	14.75	0.478	0.0452	0.026	0.0710	0.064	0.1043	0.150
0.0998	0.170	0.1413	0.062	15.10	0.660	0.0458	0.035	0.0710	0.055		
0.0996	0.156	0.1422	0.061	15.41	0.706	0.0465	0.056	0.0718	0.059	DATA SET 12	
0.1003	0.129	0.1430	0.064	15.52	0.731	0.0469	0.065	0.0730	0.052	T = 77.0	
0.1015	0.121	0.1445	0.067	15.73	0.748	0.0472	0.082	0.0763	0.036		
0.1019	0.115	0.1462	0.067	15.99	0.763	0.0480	0.089	0.0771	0.035	13.49	0.013
0.1023	0.110	0.1477	0.070	16.33	0.773	0.0486	0.099	0.0771	0.035	13.96	0.047
0.1029	0.101	0.1488	0.073	16.63	0.778	0.0492	0.132	0.0786	0.037	14.94	0.230
0.1035	0.097	0.1504	0.074	17.37	0.779	0.0492	0.144	0.0791	[illegible]	15.45	0.532
0.1039	0.091	0.1519	0.078	18.03	0.763	0.0494	0.137	0.0814	0.039	15.97	0.310
0.1047	0.088	0.1530	0.076	19.67	0.710	0.0494	0.148	0.0814	0.093	16.57	0.362
0.1053	0.084	0.1540	0.081	19.99	0.711	0.0504	0.198	0.0822	0.096	[illegible]	0.342
0.1063	0.092	0.1551	0.081	20.27	0.719	0.0512	0.195	0.0835	0.105	18.96	0.319
0.1073	0.080	0.1575	0.083	20.65	0.746	0.0512	0.211	0.0835	0.103	[illegible]	0.791
0.1082	0.077	0.1593	0.083	21.28	0.803	0.0525	0.248	0.0845	0.104	21.99	0.871
0.1091	0.077	0.1596	0.081	21.77	0.928	0.0525	0.263	0.0854	0.110	[illegible]	0.904
0.1103	0.073	0.1627	0.079	22.54	0.862	0.0533	0.291	0.0862	0.136	22.96	0.951
0.1110	0.072	0.1646	0.079	23.38	0.835	0.0538	0.297	0.0873	0.109	23.97	0.933
0.1124	0.068	0.1666	0.076	24.26	0.901	0.0549	0.277	0.0882	0.092	24.96	0.910
0.1136	0.058	0.1694	0.076	25.35	0.912	0.0551	0.257	0.0890	0.093	26.0[illegible]	0.928
0.1143	0.064	0.1710	0.072	26.85	0.912	0.0562	0.200	0.0893	0.079		
0.1154	0.064	0.1734	0.072	28.11	0.896	0.0575	0.136	0.0905	0.049	DATA SET 13	
0.1167	0.062	0.1771	0.069	29.1[illegible]	0.873	0.0575	0.126	0.0912	0.045	T = 293.0	
0.1185	0.058	0.1810	0.067	30.47	0.831	0.0583	0.129	0.0919	0.079		
0.1194	0.058	0.1864	0.065	32.06	0.776	0.0584	0.112	0.0925	0.183	13.51	0.004
0.1208	0.056	0.1919	0.064	33.34	0.732	0.0605	0.093	0.0939	0.278	[illegible]	0.033
0.1222	0.059	0.1977	0.062	34.51	0.676	0.0605	0.068	0.0943	0.208	14.47	0.034
0.1230	0.056			37.75	0.467	0.0616	0.076	0.0943	0.274	14.95	0.205
0.1240	0.057	DATA SET 10		38.90	0.404	0.0627	0.071	0.0962	0.337	15.45	0.495
0.1248	0.055	T = 293.0		40.17	0.361	0.0638	0.065	0.0962	0.405	15.97	0.738
0.1265	0.054			42.07	0.321	0.0641	0.056	0.0977	0.429	16.46	0.836
0.1278	0.051	12.05	0.0110	44.05	0.295	0.0645	0.058	0.0984	0.422	16.99	0.820

TABLE 8. EXPERIMENTAL DATA ON THE REFLECTIVITY OF LITHIUM FLUORIDE (continued)

DATA SET 13 (CONT.)

λ	ρ
17.44	0.833
17.97	0.818
18.47	0.806
18.96	0.785
19.47	0.769
19.97	0.754
20.45	0.747
20.98	0.794
21.45	0.822
21.96	0.842
22.45	0.839
22.93	0.852
23.44	0.874
24.44	0.875
24.95	0.880

DATA SET 14
T = 573.0

λ	ρ
14.00	0.027
14.51	0.058
14.95	0.160
15.46	0.469
15.97	0.553
16.45	0.731
16.96	0.705
17.48	0.736
17.97	0.772
18.50	0.772
18.93	0.766
19.46	0.740
19.98	0.719
20.46	0.717
20.96	0.712
21.44	0.746
21.95	0.730
22.45	0.781
22.94	0.834
23.44	0.815
23.94	0.815

DATA SET 14 (CONT.)

λ	ρ
24.44	0.831
24.93	0.794
25.42	0.794

DATA SET 15
T = 300.0

λ	ρ
14.5	0.24
15.0	0.53
15.5	0.60
17.0	0.70
18.0	0.66
19.0	0.65
20.0	0.70
22.0	0.83
25.0	0.83
28.0	0.81
31.0	0.76
33.0	0.66
34.0	0.58
35.0	0.50
36.0	0.40

DATA SET 16
T = 300.0

λ	ρ
14.5	0.10
15.0	0.50
16.0	0.60
18.0	0.62
19.0	0.66
2[illegible]	0.70
25.0	0.82
28.0	0.80
30.0	0.76
32.0	0.64
34.0	0.48
36.0	0.34

DATA SET 17
T = 298.0

λ	ρ
0.1347	0.05
0.1438	0.05
0.1573	0.04
0.1640	0.02

DATA SET 18
T = 298.0

λ	ρ
8.0	0.016
12.7	0.074
14.1	0.344
14.5	0.484
14.9	0.499
15.7	0.678
16.1	0.713
17.0	0.718
18.0	0.711
19.0	0.686
20.0	0.671
20.6	0.701
22.0	0.771
22.9	0.802
24.5	0.827
25.8	0.866
26.8	0.871
27.7	0.874
29.4	0.858
31.0	0.815
32.9	0.751
33.5	0.737
33.9	0.644
34.9	0.523
36.9	0.474

DATA SET 19
T = 298.0

λ	ρ
13.5	0.068
14.5	0.327

DATA SET 19 (CONT.)

λ	ρ
15.4	0.436
16.0	0.477
17.1	0.549
18.1	0.549
19.0	0.568
20.0	0.506
21.0	0.528
22.0	0.562
23.9	0.608
25.0	0.610
26.1	0.629
27.1	0.630
28.1	0.621
29.0	0.616
30.0	0.607
30.9	0.596
31.9	0.572
32.9	0.536
33.9	0.490
36.0	0.398
36.9	0.359

DATA SET 20
T = 298.0

λ	ρ
10.6	0.008
12.0	0.019
12.7	0.033
13.1	0.064
13.6	0.113
13.9	0.191
14.4	0.369
15.0	0.663
15.4	0.719
16.0	0.773
16.6	0.792
17.1	0.795
17.9	0.787
18.6	0.766
19.3	0.733

DATA SET 20 (CONT.)

λ	ρ
19.9	0.725
20.5	0.743
21.3	0.794
22.0	0.847
22.9	0.880
23.8	0.898
25.0	0.933
27.4	0.931
29.5	0.884
30.7	0.864
31.8	0.804
32.4	0.750
33.1	0.687
34.5	0.591

DATA SET 21
T = 298.0

λ	ρ
2.00	0.058
4.96	0.048
13.7	0.054
14.1	0.139
14.1	0.487
15.4	0.625
16.8	0.642
18.4	0.593
21.3	0.712
23.8	0.799
26.8	0.841
29.9	0.802
33.3	0.594
36.1	0.435
39.5	0.373
42.0	0.292
43.8	0.249
45.6	0.242
46.3	0.181
47.7	0.133
53.0	0.152

DATA SET 22
T = 298.0

λ	ρ
0.0306	0.002
0.0372	0.013
0.0458	0.066
0.0501	0.101
0.0544	0.140
0.0592	0.091
0.0626	0.057
0.0711	0.043
0.0747	0.043
0.0776	0.055
0.0832	0.080
0.0914	0.069
0.0943	0.149
0.0973	0.224
0.1[illegible]	0.10[illegible]
0.103	0.10[illegible]

DATA SET 23
T = 298.0

λ	ρ
0.0306	0.078
0.0370	0.100
0.0447	0.224
0.0505	0.312
0.0549	0.252
0.0579	0.201
0.0626	0.149
0.0711	0.124
0.0762	0.136
0.0839	0.162
0.0909	0.141
0.0936	0.171
0.0946	0.210
0.0966	0.274
0.103	0.155

TABLE 8. EXPERIMENTAL DATA ON THE REFLECTIVITY OF LITHIUM FLUORIDE (continued)

DATA SET 24
T = 298.0

λ	ρ
0.0372	0.033
0.0447	0.018
0.0511	0.036
0.0537	0.048
0.0554	0.047
0.0569	0.041
0.0594	0.027
0.0611	0.017
0.0653	0.012
[illegible]	[illegible]
0.0748	0.011
0.0749	0.015
[illegible]	[illegible]
[illegible]	0.024
[illegible]	0.022
[illegible]	0.019
[illegible]	0.023
[illegible]	0.052
0.0962	0.083
0.0971	0.084
[illegible]	0.079

DATA SET 25
T = 298.0

λ	ρ
14.8	0.335
15.0	0.305
15.7	0.335
16.0	0.357
16.7	0.365
18.1	0.366
19.9	0.393
20.0	0.400
20.6	0.427
21.3	[illegible]
22.1	[illegible]
22.9	0.522
23.8	0.559
24.5	0.593

DATA SET 25(CONT.)

λ	ρ
25.6	0.618
26.5	0.636
27.6	0.647
29.1	0.647
30.0	0.632
31.0	0.612
32.4	0.590
33.1	0.570
33.9	0.543
34.0	0.513
35.2	0.492
36.0	0.454

DATA SET 26
T = 298.0

λ	ρ
14.4	0.392
14.7	0.427
15.2	0.442
15.7	0.458
16.3	0.462
17.3	0.452
18.2	0.492
19.0	0.434
19.6	0.473
20.1	0.473
20.6	0.491
21.2	0.523
22.1	0.556
23.3	0.593
24.3	0.621
25.0	0.659
26.9	0.721
28.0	0.756
29.2	0.772
30.4	0.772
31.5	0.752
32.5	0.724
33.0	0.679
33.6	0.632

DATA SET 26(CONT

λ	ρ
34.4	0.581
35.2	0.536
35.9	0.509

DATA SET 27
T = 298.0

λ	ρ
14.5	0.420
14.9	0.453
15.6	0.478
17.1	0.520
18.3	0.528
19.2	0.504
19.5	0.504
20.4	0.524
21.1	0.563
22.5	0.649
23.1	0.673
23.8	0.687
25.1	0.713
26.6	0.756
27.3	[illegible]
28.3	0.825
29.7	0.825
30.4	0.812
31.0	[illegible]
31.7	0.756
33.5	0.706
34.9	0.651
35.0	0.639

DATA SET 28
T = 298.0

λ	ρ
14.5	0.420
14.8	0.501
15.0	0.543
15.4	0.587
15.9	0.628
16.4	0.653

DATA SET 28(CONT.)

λ	ρ
17.1	0.658
18.7	0.665
19.3	0.647
20.0	0.627
20.3	0.626
21.5	0.675
22.6	0.724
23.4	0.744
24.3	0.777
25.2	0.796
26.1	0.825
27.0	0.829
28.1	0.837

DATA SET 29
T = 298.0

λ	ρ
16.9	0.678
16.5	0.691
18.5	0.691
19.2	0.679
19.5	0.649
20.3	0.645
22.2	0.721
23.1	0.761
24.4	0.794
25.6	0.827
26.5	0.843
27.9	0.858
29.2	0.859
30.2	0.841
31.9	0.823
31.5	0.801
32.4	0.758
33.3	0.764
34.3	0.653
35.0	0.623
36.1	0.592

DATA SET 30
T = 29[illegible].0

λ	ρ
13.7	0.610
14.8	0.625
15.8	0.742
17.7	0.757
19.7	0.697
21.8	0.832
23.5	0.873
25.8	0.895
26.0	0.885
28.7	0.858
28.0	0.781
33.9	0.651
35.7	0.549

DATA SET 31
T = [illegible]

λ	ρ
0.0413	0.014
0.0423	0.015
0.0435	0.010
0.0444	0.021
0.0451	0.031
0.0462	0.055
0.0470	0.057
0.0490	0.154
0.0504	0.211
0.0521	0.277
0.0529	0.345
0.0532	0.391
0.0536	0.344
0.0545	0.282
0.0553	0.197
0.0560	0.143
0.0576	0.117
0.0649	0.044
0.0659	0.041
0.0670	0.043
0.0692	[illegible]
0.0704	0.052

DATA SET 31(CONT.)

λ	ρ
0.0729	0.042
0.0760	0.030
0.0775	0.023
[illegible]	0.072
[illegible]	0.089
0.0920	0.093
0.0945	[illegible]
[illegible]	0.034
[illegible]	0.023
[illegible]	0.033
0.0953	0.022
0.0934	[illegible]
[illegible]	0.170
[illegible]	0.045
0.1042	0.027

DATA SET 32
T = 300.0

λ	ρ
2.50	0.064
2.57	0.052
2.59	0.059
2.67	0.050
2.63	0.066
2.70	0.060
2.80	[illegible]
2.84	0.038
2.95	0.038
2.97	0.060
3.05	0.050
3.07	0.055
[illegible]	[illegible]
3.11	0.059
3.16	0.055
3.17	[illegible]
3.35	[illegible]
3.40	[illegible]
4.01	[illegible]
4.24	0.061
4.44	0.357

TABLE 9. EXPERIMENTAL DATA ON THE REFLECTIVITY OF LITHIUM FLUORIDE (continued)

DATA SET 32(CONT.)

λ	ρ
5.26	0.053
5.81	[illegible]
6.00	[illegible]
6.23	[illegible]
6.24	[illegible]
6.95	[illegible]
7.21	[illegible]
7.23	[illegible]
8.32	[illegible]
11.51	[illegible]
12.55	[illegible]
13.07	[illegible]
13.40	0.057
13.79	0.073
13.96	[illegible]
[illegible]	[illegible]
14.21	[illegible]
14.47	[illegible]
14.72	0.569
14.74	0.592
15.15	[illegible]
15.44	0.777
15.77	0.793
15.77	[illegible]
16.15	0.333
[illegible]	0.545
17.32	0.334
18.72	[illegible]
19.23	0.779
19.72	0.754
20.04	0.750
20.20	0.524
21.00	0.393
21.09	[illegible]
22.03	0.332
23.04	0.357
23.07	0.350
23.54	0.392
25.12	0.332
25.93	[illegible]

DATA SET 32(CONT.)

λ	ρ
25.37	0.934
29.32	0.905
30.21	0.353
30.59	0.815
30.53	0.930
31.15	0.946
31.74	0.917
32.35	0.917
33.33	[illegible]
34.12	0.759
35.09	0.702
35.33	0.377

DATA SET 33
T = 135.0

λ	ρ
15.42	0.715
15.33	0.709
15.52	0.823
17.30	0.825
17.79	0.926
18.34	0.799
18.49	0.797
20.12	0.822
20.43	0.951
23.29	0.944
25.04	0.907
28.02	0.945
29.07	0.925
32.79	0.757
34.72	0.807

DATA SET 34
T = 220.0

λ	ρ
16.50	0.752
16.30	0.765
17.32	0.769
17.55	0.788
18.40	0.776

DATA SET 34(CONT.)

λ	ρ
19.25	0.762
19.88	0.773
20.02	0.793
23.04	0.859
23.47	0.900
24.27	0.913
25.57	0.923
26.73	0.925
27.02	0.932
29.67	0.857

DATA SET 35
T = 330.0

λ	ρ
11.13	0.004
11.61	0.007
12.19	0.007
12.62	0.015
13.44	0.059
13.53	0.091
14.13	0.132
15.36	0.238
15.57	0.494
15.72	0.567
15.97	0.659
16.35	0.722
16.61	0.751
17.03	0.756
17.51	0.771
17.93	0.751
18.51	0.743
19.15	0.735
19.34	0.723
19.84	0.716
20.12	0.716
20.44	0.725
20.70	0.739
20.92	0.753
21.32	0.775
21.68	0.622

DATA SET 35(CONT.)

λ	ρ
22.67	0.850
23.30	0.869
24.33	0.885
25.00	0.893
25.97	0.896
26.38	0.905
27.35	0.875
28.57	0.861
29.05	0.850
31.48	0.811
32.25	0.794
32.94	0.765
33.06	0.727
34.03	0.554
35.33	0.500
35.36	0.460
36.03	0.427
36.70	0.390
37.31	0.375
37.59	0.329
38.31	0.317
39.75	0.300
[illegible]	0.289
42.00	0.269
47.16	0.248
50.50	0.241
54.64	0.244
57.80	0.236
64.10	0.236

DATA SET 36
T = 355.0

λ	ρ
16.44	0.724
16.77	0.742
17.39	0.748
17.88	0.743
18.41	0.725
19.31	0.695
19.41	0.689

DATA SET 36(CONT.)

λ	ρ
19.34	0.850
20.60	0.893
21.30	0.744
22.22	0.743
23.07	0.659
24.27	0.659
25.57	0.460
27.10	0.693
29.24	0.328

DATA SET 37
T = 360.0

λ	ρ
2.00	0.0306
2.72	0.0300
3.93	0.0254
4.76	0.0295
5.40	0.0241
6.13	0.0230
6.81	0.0259
7.27	0.0194
7.89	0.0120
8.25	0.0030
8.77	0.0102
9.21	0.0047
9.67	0.0031
10.03	0.0008
10.61	0.0010
11.20	0.0024
11.87	0.0055
12.12	0.0095
12.30	0.0159
12.75	0.0236
13.02	0.0349
13.19	0.0550
13.47	0.0600
14.02	0.1249

DATA SET 38
T = 293.0

λ	ρ
14.0	0.077
14.5	0.165
14.8	0.404
15.4	0.673
15.9	0.751
17.0	0.749
17.9	0.763
19.5	0.741
19.5	0.725
20.1	0.708
21.5	0.511
23.0	0.506
23.9	0.360
24.9	0.317
25.0	0.430
27.0	0.424
27.5	0.415
28.0	[illegible]
29.3	0.374
30.9	0.443
32.9	0.734
34.0	0.039
34.5	0.050
35.0	0.543
36.1	0.476
39.0	0.433

DATA SET 39
T = 293.0

λ	ρ
14.72	0.074
15.20	0.473
15.35	0.553
15.02	0.605
15.94	0.654
16.33	0.631
16.39	0.695
17.27	0.657
18.11	0.632

TABLE 8. EXPERIMENTAL DATA ON THE REFLECTIVITY OF LITHIUM FLUORIDE (continued)

λ	ρ
DATA SET 39(CONT.)	
18.54	0.665
19.23	0.643
19.55	0.627
19.70	0.625
20.24	0.536
21.14	0.738
22.02	0.75[illegible]
23.2[illegible]	0.7[illegible]9
24.0[illegible]	0.[illegible]22
25.97	0.[illegible]47
27.17	0.[illegible]61
28.65	0.853
29.75	0.[illegible]51
30.95	0.817
31.84	0.773
32.75	0.694
33.7[illegible]	0.[illegible]17
34.[illegible]4	0.555
35.84	0.5[illegible]
37.03	0.453
38.75	0.415
40.8[illegible]	0.399
43.66	0.374
45.45	0.368
47.61	0.353
DATA SET 40	
T = 293.0	
0.0[illegible]93	0.2163
0.0904	0.29[illegible]8
0.0971	0.3[illegible]94
0.0[illegible]56	0.2943
0.0991	0.2466
0.1002	0.1915
0.1016	0.1357
0.1025	0.1229
0.1035	0.1065
0.1048	0.1015
0.1051	0.0953

λ	ρ
DATA SET 40(CONT.)	
0.1065	0.0843
0.1072	0.0782
0.1079	0.0782
0.1[illegible]94	0.0736
0.1095	0.0723
0.1108	0.0703
0.1117	0.071[illegible]
0.1125	0.0[illegible]3
0.1140	0.0624
0.1162	0.0605
0.1170	0.0578
0.1192	0.0578
0.1216	0.0557
0.1231	0.0546
0.1246	0.0526
0.125[illegible]	0.054[illegible]
0.1281	0.05[illegible]
0.1334	0.0482
0.1364	0.0465
0.14[illegible]2	0.0485
0.1430	0.0447
0.14[illegible]7	0.0445
0.15[illegible]6	0.04[illegible]6
0.1527	0.0426
0.1530	0.0401
0.154[illegible]	0.0414
0.1544	0.0414
0.1550	0.0395
DATA SET 41	
T = 300.0	
8.69	0.006
8.77	0.006
8.84	0.006
8.92	0.005
9.0[illegible]	0.005
9.09	0.005
9.17	0.004
9.25	0.004

λ	ρ
DATA SET 41(CONT.)	
9.34	0.004
9.43	0.004
9.52	0.003
9.61	0.003
9.71	0.003
9.80	0.002
9.90	0.002
10.00	0.002
10.10	0.001
10.20	0.001
10.30	0.001
11.76	0.001
11.90	0.002
12.04	0.003
12.19	0.004
12.34	0.005
12.50	0.007
12.65	0.010
12.82	0.013
12.98	0.017
13.15	0.021
13.33	0.027
13.51	0.035
13.69	0.048
13.88	0.065
14.08	0.091
14.28	0.126
14.49	0.182
14.70	0.290
14.92	0.446
15.15	0.630
15.38	0.684
15.62	0.718
15.87	0.741
16.12	0.758
16.39	0.768
16.66	0.772
16.94	0.772
17.24	0.768
17.54	0.761

λ	ρ
DATA SET 41(CONT.)	
17.85	0.752
18.18	0.742
18.51	0.732
18.86	0.721
19.23	0.711
19.60	0.700
20.00	0.688
20.40	0.705
20.83	0.740
21.27	0.776
21.73	0.798
22.22	0.825
22.72	0.850
23.25	0.870
23.80	0.885
24.39	0.894
25.00	0.9[illegible]0
25.64	0.902
26.31	0.902
27.02	0.902
27.77	0.902
28.57	0.902
29.41	0.902
30.30	0.896
31.25	0.882
32.25	0.835
33.33	0.732
34.48	0.624
35.71	0.544
37.03	0.492
38.46	0.477
40.00	0.426
41.66	0.404
43.47	0.384
45.45	0.368
47.61	0.355
50.00	0.342

λ	ρ
DATA SET 42	
T = 80.0	
8.69	0.006
8.77	0.006
8.84	0.006
8.92	0.005
9.00	0.005
9.09	0.005
9.17	0.004
9.25	0.004
9.34	0.004
9.43	0.004
9.52	0.003
9.61	0.003
9.70	0.003
9.80	0.002
9.90	0.002
10.00	0.002
10.10	0.001
10.20	0.001
10.30	0.001
11.76	0.001
11.9[illegible]	0.002
12.04	0.003
12.19	0.004
12.34	0.005
12.50	0.007
12.65	0.010
12.82	0.013
12.98	0.017
13.15	0.022
13.33	0.028
13.51	0.033
13.69	0.052
13.88	0.073
14.08	0.093
14.25	0.140
14.49	0.215
14.70	0.318
14.92	0.521
15.15	0.7[illegible]5

λ	ρ
DATA SET 42(CONT.)	
15.38	0.758
15.62	0.783
15.87	0.799
16.12	0.812
16.39	0.823
16.66	0.824
16.94	0.823
17.24	0.81[illegible]
17.54	[illegible]
17.85	0.79[illegible]
18.18	[illegible]
18.51	0.781
18.86	0.772
19.23	0.762
[illegible]	0.75[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
20.83	0.[illegible]39
21.27	0.857
21.73	0.[illegible]37
22.22	[illegible]
22.71	[illegible]7
23.25	0.93[illegible]
23.80	0.94[illegible]
24.39	0.949
25.00	0.952
25.64	0.954
26.31	0.956
27.02	0.956
27.77	0.954
28.57	0.952
29.41	0.945
30.30	0.926
31.25	0.892
32.25	0.791
33.33	0.6[illegible]
34.48	0.5[illegible]
35.71	0.470
37.03	0.436
38.46	0.420

TABLE 8. EXPERIMENTAL DATA ON THE REFLECTIVITY OF LITHIUM FLUORIDE (continued)

λ	ρ
DATA SET 42(CONT.)	
40.00	0.378
41.66	0.352
43.47	0.352
45.45	0.342
47.61	0.332
50.00	0.322
DATA SET 43	
T = 23.0	
8.69	0.006
8.77	0.010
8.84	0.005
8.92	0.005
9.00	0.005
9.09	0.005
9.17	0.004
9.25	0.004
9.34	0.004
9.43	0.003
9.52	0.003
9.61	0.003
9.70	0.003
9.80	0.002
9.90	0.002
10.00	0.002
10.10	0.001
10.20	0.001
10.30	0.001
11.75	0.001
11.90	0.002
12.04	0.003
12.19	0.004
12.34	0.005
12.50	0.007
12.65	0.010
12.82	0.014
12.93	0.019
13.15	0.024
13.33	0.032

λ	ρ
DATA SET 43(CONT.)	
13.51	0.042
13.69	0.055
13.88	0.075
14.08	0.096
14.28	0.137
14.49	0.209
14.70	0.234
14.92	0.524
15.15	0.717
15.38	0.766
15.62	0.791
15.87	0.806
16.12	0.822
16.39	0.833
16.66	0.826
16.94	0.832
17.24	0.825
17.54	0.817
17.85	0.808
18.18	0.801
18.51	0.793
18.86	0.784
19.23	0.774
19.60	0.786
20.00	0.818
20.40	0.858
20.83	0.882
21.27	0.902
21.73	0.919
22.22	0.933
22.72	0.945
23.25	0.955
23.80	0.963
24.39	0.969
25.00	0.972
25.64	0.975
26.31	0.976
27.02	0.977
27.77	0.977
28.57	0.975

λ	ρ
DATA SET 43(CONT.)	
29.41	0.966
30.30	0.942
31.25	0.898
32.25	0.796
33.33	0.615
34.48	0.534
35.71	0.475
37.03	0.426
38.46	0.398
40.00	0.374
41.66	0.357
43.47	0.343
45.45	0.335
47.61	0.326
50.00	0.326

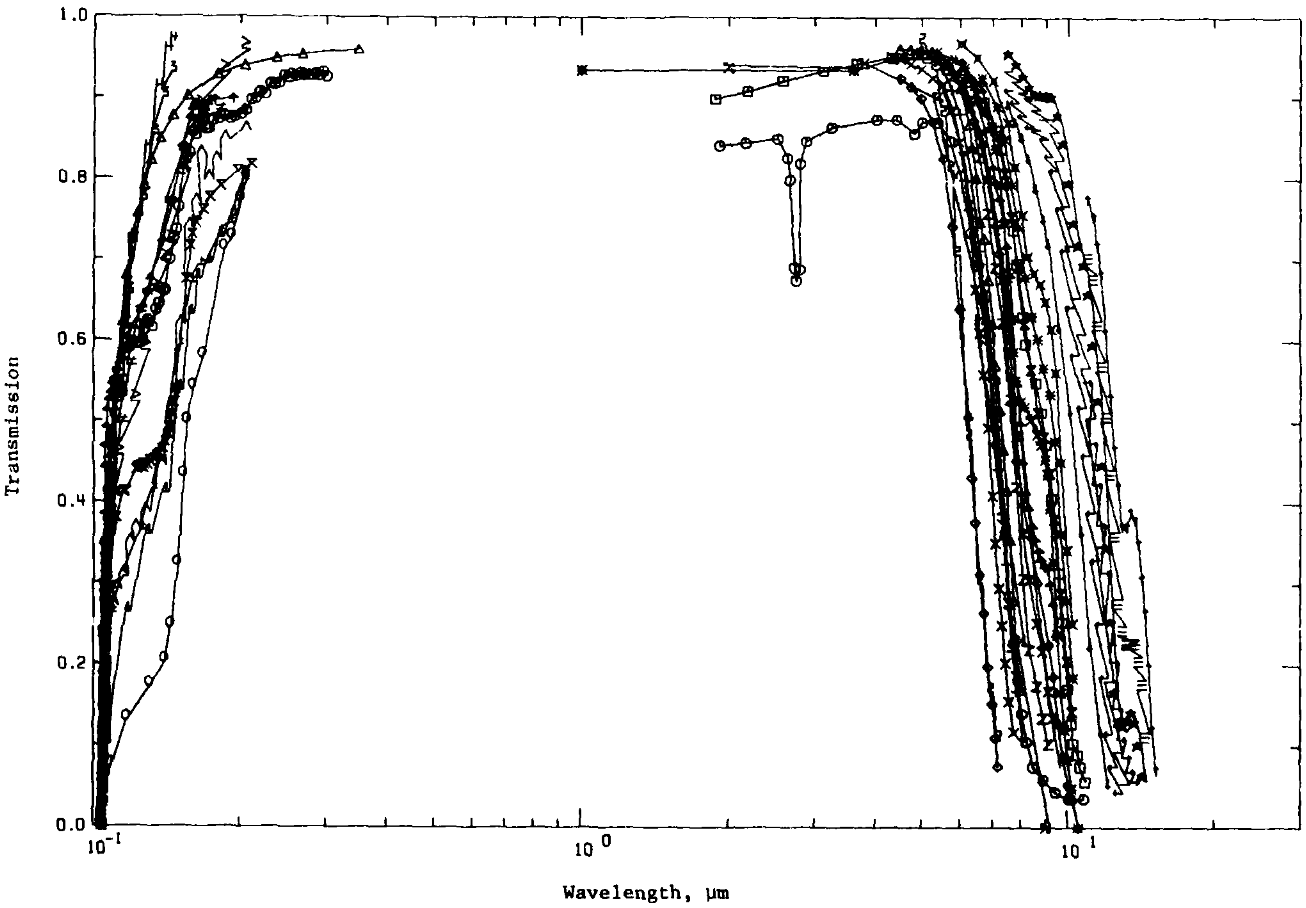

Figure 8. Transmission of Lithium Fluoride

TABLE 9. SUMMARY OF MEASUREMENTS ON THE TRANSMISSION OF LITHIUM FLUORIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	34	Kato, R.	1961	T	1.8-11.0	283	High purity; single crystal; freshly cleaved specimens with thicknesses unspecified; data extracted from a curve.
2	34	Kato, R.	1961	T	1.9-11.0	283	Similar to above except crystal grown in air in order to see the effects of hydrolysis on the transmittances; transmission spectrum shows an absorption near 2.8 μm due to the vibration of O-H bond.
3	41	Klier, M.	1958	T	4.5-8.0	77	Crystal; thin specimen of 6153 μm thick; transmittance spectrum measured; data extracted from a figure.
4	41	Klier, M.	1958	T	4.5-8.0	195	Same as above.
5	41	Klier, M.	1958	T	4.5-8.0	293	Same as above.
6	41	Klier, M.	1958	T	4.5-8.0	573	Same as above.
7	41	Klier, M.	1958	T	6.0-9.50	77	Same as above except for specimen of 2021 μm thick.
8	41	Klier, M.	1958	T	5.5-9.32	195	Same as above.
9	41	Klier, M.	1958	T	5.5-9.12	293	Same as above.
10	41	Klier, M.	1958	T	5.5-58.1	573	Same as above.
11	41	Klier, M.	1958	T	6.0-10.3	77	Same as above except for specimen of 726 μm thick.
12	41	Klier, M.	1958	T	6.6-10.3	195	Same as above.
13	41	Klier, M.	1958	T	6.0-10.3	293	Same as above.
14	41	Klier, M.	1958	T	6.0-9.7	573	Same as above.
15	41	Klier, M.	1958	T	75-14.2	77	Same as above except for specimen of 145 μm thick.
16	41	Klier, M.	1958	T	7.5-13.2	195	Same as above.
17	41	Klier, M.	1958	T	7.5-12.7	293	Same as above.
18	41	Klier, M.	1958	T	7.4-12.2	573	Same as above.
19	41	Klier, M.	1958	T	10.9-15.3	77	Same as above except for specimen of 60.1 μm thick.
20	41	Klier, M.	1958	T	10.9-14.5	195	Same as above.
21	41	Klier, M.	1958	T	10.9-13.8	293	Same as above.
22	54	McCarthy, D.E.	1963	T	2-50	298	Synthetic crystal; 5 mm thick; polished to flatness of seven fringes on both sides; data extracted from a curve.

TABLE 9. SUMMARY OF MEASUREMENTS ON THE TRANSMISSION OF LITHIUM FLUORIDE (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, µm	Temperature, K	Specifications and Remarks
23	62	Davis, R.J.	1966	T	0.104-0.205	298	Single crystal; freshly cleaved; 1.3 mm thick; measured in vacuum; data extracted from a curve.
24	62	Davis, R.J.	1966	T	0.104-0.205	298	The above specimen measured after 20 months storage in a chemical desiccator.
25	62	Davis, R.J.	1966	T	0.104-0.205	298	The above specimen measured after 2 minutes of ultrasonic cleaning in absolute ethyl alcohol.
26	62	Davis, R.J.	1966	T	0.104-0.205	298	Polished; 2.0 mm thick; measured in vacuum; data extracted from curve.
27	62	Davis, R.J.	1966	T	0.104-0.205	298	The above specimen measured after 11 months storage in uncontrolled environment (humidity never exceeding 95 %).
28	62	Davis, R.J.	1966	T	0.104-0.205	298	The above specimen measured after 2 minutes of ultrasonic cleaning in absolute ethyl alcohol.
29	63	Jones, D.A., Jones, R.V., and Stevenson, R.W.	1952	T	5.00-7.19	298	Single crystal; reflection losses eliminated and transmission adjusted to standard thickness of 1 cm; data extracted from a smooth curve.
30	64	Laufer, A.H., Pirog, I.A., and Moneby, J.R.	1965	T	0.104-0.145	299	Single crystal; obtained from Harshaw Chemical Co.; freshly cleaved specimen; 1.5 mm thick; stored and measured in vacuum; data extracted from a curve.
31	64	Laufer, A.H. et al.	1965	T	0.105-0.145	336	Above specimen and conditions.
32	64	Laufer, A.H. et al.	1965	T	0.106-0.119	374	Above specimen and conditions.
33	64	Laufer, A.H. et al.	1965	T	0.107-0.109	407	Above specimen and conditions.
34	65	Heath, D.F. and Sacher, P.A.	1966	T	0.105-0.300	298	Synthetic crystal; obtained from Harshaw Chemical Co.; optically polished specimen of 2.09 mm thick; measured in vacuum; data extracted from a curve.
35	66	McCubbin, T.K. and Sinton, W.M.	1950	T	109-486	298	Specimen of 1 mm thick; data extracted from a curve.
36	67	Bolot, G.	1965	T	0.105-0.350	298	Pure LiF, 0.82 mm thick; data extracted from a curve.
37	68	Linsteadt, G.	1964	T	1.0-10.5	50	Single crystal; specimens of 1.02 mm thick and 1.27 cm in diameter; data extracted from a curve.
38	68	Linsteadt, G.	1964	T	1.0-10.5	85	Similar to above.
39	68	Linsteadt, G.	1964	T	1.0-10.5	300	Similar to above.
40	37	Tomiki, T. and Miyata, T.	1969	T	0.104-0.193	298	Single crystal; obtained from Harshaw Chemical Co.; freshly cleaved specimen of 0.221 cm thick; measurements made in a vacuum; data extracted from a curve.

TABLE 9. SUMMARY OF MEASUREMENTS ON THE TRANSMISSION OF LITHIUM FLUORIDE (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
41	37	Tomiki, T. and Miyata, T.	1969	T	0.104-0.210	298	Above conditions except for specimen of 0.200 cm thick.
42	39	Mead, D.	1974	T	43.8-438.6	6.2	Single crystal from BHD Ltd.; hand polished specimen of 1.2 mm thick; data extracted from a curve.
43	39	Mead, D.	1974	T	76.1-448.5	99.7	Above specimen and conditions.
44	39	Mead, D.	1974	T	133.5-535.0	290	Above specimen and conditions.

TABLE 10. EXPERIMENTAL DATA ON THE TRANSMISSION OF LITHIUM FLUORIDE

[Wavelength, λ, μm; Temperature, T, K; Transmission, τ]

DATA SET 1
T = 283.0

λ	τ
1.88	0.899
2.19	0.909
2.56	0.922
3.12	0.934
3.67	0.943
4.33	0.951
5.13	0.951
5.66	0.937
6.25	0.921
6.71	0.890
7.07	0.852
7.29	0.809
7.71	0.733
7.82	0.696
8.04	0.631
8.19	0.599
8.56	0.550
8.82	0.513
9.00	0.473
9.23	0.437
9.56	0.314
9.73	0.254
10.01	0.171
10.17	0.128
10.27	0.104
10.49	0.090
10.61	0.075
10.87	0.057

DATA SET 2
T = 283.0

λ	τ
1.92	0.941
2.07	0.945
2.53	0.952
2.64	0.920
2.67	0.795
2.73	0.691
2.76	0.675
2.83	0.689
2.86	0.820
2.89	0.847
3.25	0.864
4.03	0.874
4.43	0.874
4.83	0.857
5.02	0.871
5.38	0.871
5.72	0.848
6.03	0.806
6.32	0.735
6.52	0.695
6.78	0.658
6.91	0.609
7.07	0.554
7.26	0.474
7.42	0.304
7.57	0.296
7.74	0.228
7.90	0.182
8.03	0.141
8.24	0.106
8.49	0.075
8.91	0.060
9.43	0.044
10.07	0.036
10.79	0.036

DATA SET 3
T = 77.0

λ	τ
4.51	0.961
4.74	0.961
4.93	0.961
5.25	0.958
5.52	0.949
5.75	0.936
6.01	0.914
6.25	0.869
6.34	0.846
6.45	0.803
6.59	0.749
6.73	0.723
6.85	0.677
6.98	0.624
7.10	0.572
7.22	0.516
7.35	0.467
7.47	0.417
7.59	0.356
7.72	0.231
7.84	0.215
8.00	0.171

DATA SET 4
T = 195.0

λ	τ
5.51	0.937
5.75	0.911
5.98	0.882
6.19	0.836
6.33	0.799
6.45	0.754
6.58	0.713
6.70	0.671
6.83	0.616
6.96	0.555
7.09	0.496
7.20	0.443
7.32	0.389
7.46	0.326
7.56	0.272
7.70	0.218
7.84	0.169

DATA SET 5
T = 233.0

λ	τ
4.51	0.949
4.74	0.943
4.99	0.937
5.25	0.926
5.49	0.917
5.72	0.886
5.97	0.847
6.24	0.769
6.45	0.685
6.59	0.612
6.72	0.560
6.85	0.494
6.99	0.410
7.10	0.352
7.21	0.296
7.32	0.250
7.44	0.203
7.57	0.156
7.74	0.118

DATA SET 6
T = 573.0

λ	τ
4.51	0.925
4.74	0.915
4.99	0.901
5.25	0.872
5.53	0.826
5.78	0.743
5.98	0.641
6.24	0.507
6.34	0.432
6.44	0.377
6.58	0.313
6.72	0.265
6.84	0.199
6.98	0.153
7.11	0.111
7.19	0.076

DATA SET 7
T = 77.0

λ	τ
6.03	0.945
6.26	0.926
6.45	0.895
6.74	0.852
6.88	0.814
7.07	0.796
7.22	0.775
7.34	0.750
7.47	0.717
7.60	0.680
7.69	0.626
7.83	0.547
7.97	0.499
8.07	0.450
8.17	0.412
8.32	0.393
8.45	0.371
8.56	0.355
8.70	0.341
8.81	0.330
8.95	0.322
9.09	0.319
9.20	0.300
9.32	0.275
9.47	0.237

DATA SET 8
T = 195.0

λ	τ
6.03	0.926
6.28	0.895
6.57	0.854
6.83	0.800
7.07	0.733
7.32	0.677
7.58	0.603
7.83	0.484
8.09	0.363
8.34	0.306
8.63	0.252
8.87	0.213
9.12	0.168
9.32	0.135

DATA SET 9
T = 293.0

λ	τ
5.54	0.944
5.78	0.929
6.03	0.915
6.26	0.893
6.57	0.823
6.85	0.759
7.07	0.692
7.32	0.624
7.58	0.529
7.83	0.421
8.09	0.307
8.34	0.221
8.63	0.175
8.87	0.135
9.12	0.103

DATA SET 10
T = 573.0

λ	τ
5.54	0.919
5.78	0.867
6.07	0.831
6.28	0.772
6.57	0.691
6.83	0.596
7.07	0.470
7.32	0.376
7.58	0.269
7.83	0.188
8.09	0.106

TABLE 10. EXPERIMENTAL DATA ON THE TRANSMISSION OF LITHIUM FLUORIDE (continued)

DATA SET 11
T = 77.0

λ	τ
6.03	0.965
6.54	0.951
6.99	0.923
7.50	0.871
7.75	0.815
8.03	0.757
8.23	0.736
8.50	0.695
8.76	0.672
8.96	0.553
9.24	0.510
9.45	0.552
9.66	0.452
9.95	0.343
10.23	0.252

DATA SET 12
T = 195.0

λ	τ
6.03	0.926
7.15	0.931
7.39	0.951
7.64	0.734
7.47	0.742
8.15	0.684
8.41	0.632
8.65	0.624
8.91	0.596
9.16	0.535
9.39	0.477
9.67	0.393
9.95	0.280
10.24	0.185

DATA SET 13
T = 293.0

λ	τ
6.03	0.941
6.63	0.915

DATA SET 13(CONT.)

λ	τ
7.15	0.855
7.39	0.838
7.64	0.754
7.87	0.632
8.15	0.623
8.41	0.560
8.65	0.513
8.91	0.483
9.16	0.438
9.39	0.381
9.67	0.289
9.95	0.206
10.22	0.143

DATA SET 14
T = 573.0

λ	τ
5.03	0.919
6.03	0.556
6.88	0.806
7.11	0.748
7.37	0.686
7.63	0.609
7.90	0.534
8.15	0.442
8.41	0.358
8.65	0.278
8.91	0.226
9.16	0.156
9.38	0.117
9.67	0.081

DATA SET 15
T = 77.0

λ	τ
7.51	0.955
7.73	0.942
8.03	0.927
8.27	0.924
8.52	0.925

DATA SET 15(CONT.)

λ	τ
8.72	0.915
8.98	0.905
9.24	0.902
9.46	0.879
9.73	0.844
9.97	0.795
10.21	0.746
10.46	0.719
10.74	0.695
10.96	0.659
11.21	0.596
11.46	0.527
11.71	0.447
11.95	0.345
12.21	0.254
12.46	0.167
12.72	0.131
12.96	0.126
13.22	0.133
13.49	0.142
13.71	0.129
13.94	0.102
14.21	0.063

DATA SET 16
T = 195.0

λ	τ
7.51	0.935
7.79	0.922
8.03	0.908
8.27	0.912
8.56	0.887
8.87	0.876
9.13	0.876
9.34	0.859
9.57	0.824
9.82	0.768
10.07	0.719
10.38	0.655
10.65	0.610

DATA SET 16(CONT.)

λ	τ
10.88	0.569
11.13	0.507
11.65	0.347
12.18	0.181
12.74	0.094
13.17	0.055

DATA SET 17
T = 293.0

λ	τ
7.51	0.911
7.75	0.896
8.02	0.879
8.28	0.866
8.56	0.862
8.89	0.851
9.09	0.830
9.30	0.812
9.59	0.765
9.83	0.713
10.08	0.643
10.34	0.584
10.64	0.526
10.88	0.462
11.14	0.390
11.37	0.330
11.65	0.252
11.89	0.186
12.13	0.117
12.41	0.076
12.72	0.044

DATA SET 18
T = 573.0

λ	τ
7.49	0.894
7.74	0.872
7.99	0.853
8.24	0.827
8.57	0.790

DATA SET 18(CONT.)

λ	τ
8.84	0.753
9.08	0.722
9.59	0.613
10.07	0.516
10.63	0.366
11.16	0.225
11.69	0.119
12.13	0.055

DATA SET 19
T = 77.0

λ	τ
10.97	0.776
11.26	0.754
11.47	0.719
11.74	0.683
11.95	0.611
12.19	0.531
12.45	0.463
12.67	0.422
12.94	0.372
13.22	0.372
13.46	0.393
13.75	0.390
13.98	0.351
14.22	0.337
14.45	0.305
14.70	0.193
14.93	0.121
15.23	0.071

DATA SET 20
T = 195.0

λ	τ
10.97	0.744
11.26	0.676
11.47	0.621
11.70	0.573
11.95	0.507
12.19	0.437

DATA SET 20(CONT.)

λ	τ
12.48	0.360
12.70	0.277
12.94	0.244
13.22	0.227
13.45	0.227
13.75	0.227
13.93	0.206
14.22	0.177
14.45	0.112

DATA SET 21
T = 293.0

λ	τ
10.97	0.551
11.20	0.476
11.47	0.424
11.73	0.374
11.95	0.315
12.19	0.255
12.46	0.205
12.67	0.148
12.94	0.110
13.22	0.088
13.46	0.070
13.75	0.057

DATA SET 22
T = 298.0

λ	τ
2.00	0.936
3.80	0.944
5.00	0.903
6.60	0.629
8.00	0.232

DATA SET 23
T = 298.0

λ	τ
6.106	0.229
6.169	0.388

TABLE 10. EXPERIMENTAL DATA ON THE TRANSMISSION OF LITHIUM FLUORIDE (continued)

DATA SET 23(CONT.)

λ	τ
0.113	0.451
0.122	0.526
[illegible]	[illegible]
0.137	[illegible]
[illegible]	[illegible]
0.145	[illegible]
0.154	[illegible]
[illegible]	[illegible]
0.186	0.934
0.205	0.952

DATA SET 24
T = [illegible]

λ	τ
[illegible]	[illegible]
[illegible]	0.277
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
0.162	0.774
[illegible]	[illegible]
0.172	[illegible]
0.173	0.327
[illegible]	[illegible]
[illegible]	[illegible]

DATA SET 25
T = 298.[illegible]

λ	τ
0.105	[illegible]
0.107	[illegible]
0.109	0.290
0.112	0.413

DATA SET 25(CONT.)

λ	τ
0.115	0.501
0.120	0.572
0.125	0.637
0.129	0.658
0.133	0.664
0.143	0.772
0.153	0.837
0.162	0.873
0.182	0.897
0.205	0.884

DATA SET 26
T = 293.[illegible]

λ	τ
0.107	0.172
[illegible]	0.256
[illegible]	0.311
0.120	0.308
0.133	0.419
0.142	0.494
0.151	0.537
0.160	0.673
0.165	0.696
0.173	0.695
0.183	0.735
0.192	0.747
0.205	0.807

DATA SET 27
T = 298.0

λ	τ
0.107	[illegible]
0.117	0.135
0.131	0.178
0.140	0.208
0.144	0.251
0.149	0.327
0.153	0.437
0.156	0.503
0.160	0.545

DATA SET 27(CONT.)

λ	τ
0.166	0.585
0.185	0.718
0.192	0.731
0.200	0.777
0.205	0.805

DATA SET 28
T = 298.[illegible]

λ	τ
0.107	0.141
0.113	0.269
0.133	0.306
0.141	0.417
0.151	0.544
0.159	0.637
0.165	0.682
0.173	0.701
0.183	0.733
0.194	0.759
0.205	0.835

DATA SET 29
T = 298.0

λ	τ
5.00	0.975
5.29	0.943
5.53	0.886
5.73	0.818
5.92	0.713
6.26	0.486
6.60	0.305
6.95	0.174
7.19	0.114

DATA SET 30
T = 299.[illegible]

λ	τ
0.104	0.076
0.105	0.290
0.106	0.370

DATA SET 30(CONT.)

λ	τ
0.107	0.464
0.109	[illegible]
0.119	0.663
0.127	0.779
0.134	0.859
0.140	0.906
0.145	0.937

DATA SET 31
T = 336.0

λ	τ
0.106	0.319
0.107	0.369
0.108	0.428
0.109	0.462
0.116	0.627
0.121	0.730
0.129	0.844
0.136	0.915
0.142	0.962
0.145	0.974

DATA SET 32
T = 374.0

λ	τ
0.106	0.035
0.108	0.365
0.109	0.487
0.111	0.560
0.117	0.678
0.119	0.725

DATA SET 33
T = 407.0

λ	τ
0.107	0.486
0.109	0.432

DATA SET 34
T = 298.0

λ	τ
0.105	0.191
0.106	0.349
0.107	0.415
0.108	[illegible]
0.109	0.475
0.111	0.509
0.112	0.523
0.113	0.537
0.114	0.534
0.115	0.550
0.116	0.552
0.117	0.559
0.118	0.564
0.119	0.594
0.120	0.597
0.122	0.595
0.123	0.595
0.125	0.613
0.126	[illegible]
0.127	0.612
0.128	0.620
0.129	0.624
0.132	0.616
0.134	0.638
0.136	0.645
0.139	0.661
0.140	0.662
0.143	0.701
0.146	0.727
0.148	0.737
0.149	0.705
0.152	0.812
0.155	0.826
0.157	0.831
0.160	0.857
0.162	0.853
0.164	0.864
0.166	0.870
0.167	0.865

DATA SET 34(CONT.)

λ	τ
0.168	0.865
0.170	0.861
0.172	0.901
0.175	0.872
0.180	0.875
0.185	0.877
0.190	0.873
0.194	0.872
0.200	0.879
0.205	0.885
0.210	0.893
[illegible]	[illegible]
[illegible]	[illegible]
0.225	0.915
0.230	0.918
0.235	0.916
[illegible]	[illegible]
0.245	0.927
0.250	[illegible]
0.255	[illegible]
0.260	0.927
0.265	0.932
0.270	0.928
0.275	0.924
0.280	0.928
0.285	0.914
0.290	0.927
0.295	0.933
0.300	0.926

DATA SET 35
T = 293.[illegible]

λ	τ
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
250.0	[illegible]
294.0	0.31
345.0	0.53
394.0	0.53

TABLE 10. EXPERIMENTAL DATA ON THE TRANSMISSION OF LITHIUM FLUORIDE (continued)

λ	τ
DATA SET 35(CONT.)	
445.1	0.95
46[illegible]	0.95
DATA SET 36	
T = 295.0	
0.105	0.137
0.106	0.214
0.109	0.339
0.112	0.547
0.115	0.624
0.117	0.681
0.120	0.726
0.123	0.755
0.127	0.791
0.131	0.822
0.137	0.850
0.145	0.875
0.155	0.912
0.179	0.929
0.204	0.941
0.237	0.949
0.263	0.954
0.351	0.960
DATA SET 37	
T = 5[illegible]	
1.00	0.939
3.01	0.945
4.37	0.950
4.85	0.959
5.37	0.953
5.85	0.949
6.10	0.939
6.41	0.927
6.73	0.894
6.93	0.855
7.09	0.835
7.26	0.794

λ	τ
DATA SET 37(CONT.)	
7.33	0.746
7.51	0.680
7.62	0.628
7.71	0.588
7.81	0.553
7.97	0.527
8.13	0.520
8.37	0.510
8.62	0.492
8.83	0.476
8.97	0.455
9.08	0.437
9.19	0.394
9.34	0.328
9.54	0.239
9.68	0.167
9.84	0.121
10.01	0.084
10.20	0.048
DATA SET 38	
T = 65.0	
1.00	0.935
3.01	0.935
4.37	0.950
4.85	0.950
5.37	0.950
5.85	0.949
6.10	0.939
6.41	0.917
6.73	0.864
6.93	0.860
7.09	0.838
7.25	0.794
7.36	0.746
7.51	0.650
7.62	0.628
7.71	0.588
7.81	0.553

λ	τ
DATA SET 38(CONT.)	
7.97	0.527
8.13	0.520
8.37	0.504
8.62	0.486
8.83	0.473
8.97	0.455
9.08	0.437
9.19	0.394
9.34	0.328
9.54	0.239
9.68	0.167
9.84	0.121
10.01	0.064
10.20	0.048
DATA SET 39	
T = 300.0	
1.00	0.935
3.01	0.935
4.37	0.950
5.33	0.953
5.65	0.943
5.92	0.925
6.35	0.873
6.65	0.844
6.89	0.800
7.20	0.710
7.43	0.623
7.65	0.525
7.83	0.454
8.09	0.400
8.67	0.333
9.14	0.225
9.33	0.186
9.55	0.129
9.81	0.088
10.02	0.053
10.24	0.035

λ	τ
DATA SET 40	
T = 293.0	
0.1042	0.008
0.1044	0.024
0.1045	0.057
0.1047	0.121
0.1050	0.240
0.1053	0.347
0.1054	0.384
0.1057	0.442
0.1060	0.469
0.1065	0.491
0.1070	0.512
0.1077	0.525
0.1084	0.534
0.1092	0.545
0.1105	0.551
0.1118	0.556
0.1122	0.562
0.1133	0.571
0.1143	0.577
0.1158	0.588
0.1172	0.602
0.1191	0.614
0.1260	0.639
0.1269	0.659
0.1308	0.674
0.1383	0.722
0.1448	0.772
0.1521	0.838
0.1569	0.873
0.1591	0.854
0.1612	0.890
0.1625	0.891
0.1638	0.889
0.1646	0.885
0.1660	0.883
0.1668	0.885
0.1687	0.894
0.1708	0.891
0.1734	0.896

λ	τ
DATA SET 40(CONT.)	
0.1771	0.897
0.1928	0.898
DATA SET 41	
T = 298.0	
0.1042	0.008
0.1044	0.024
0.1045	0.057
0.1047	0.110
0.1050	0.147
0.1051	0.235
0.1054	0.283
0.1056	0.315
0.1058	0.325
0.1063	0.342
0.1072	0.357
0.1081	0.371
0.1091	[illegible]
0.1101	0.381
0.1112	0.381
0.1150	0.413
0.1160	0.423
0.1225	0.440
0.1232	0.442
0.1246	0.443
0.1260	0.442
0.1262	0.441
0.1267	0.440
0.1291	0.445
0.1318	0.450
0.1334	0.453
0.1352	0.457
0.1373	0.460
0.1391	0.466
0.1409	0.474
0.1425	0.463
0.1435	0.493
0.1452	0.503
0.1462	0.523

λ	τ
DATA SET 41(CONT.)	
0.1472	0.539
0.1550	0.675
0.1579	0.716
0.1593	0.731
0.1623	0.745
0.1671	0.761
0.1725	0.777
0.1823	0.791
0.1958	0.803
0.2161	0.814
DATA SET 42	
T = 6.2	
43.6	0.253
53.1	0.284
53.6	0.291
54.6	0.301
[illegible]	[illegible]
60.5	0.357
75.0	0.443
75.9	0.467
82.1	0.484
87.7	0.500
94.3	0.512
104.9	0.524
120.7	0.533
134.4	0.541
164.5	0.540
193.3	0.544
224.4	0.546
231.4	0.5[illegible]
438.5	0.577
DATA SET 43	
T = 99.7	
70.1	0.013
78.0	0.014
81.4	0.017

TABLE 10. EXPERIMENTAL DATA ON THE TRANSMISSION OF LITHIUM FLUORIDE (continued)

λ	τ
DATA SET 43 (CONT.)	
86.2	0.022
90.1	0.026
95.9	0.029
102.9	0.029
109.0	0.024
114.2	0.021
119.1	0.021
124.2	0.029
126.9	0.042
129.1	0.09[illegible]
132.9	0.150
135.5	0.25[illegible]
138.1	0.440
14[illegible]	0.453
153.4	0.470
165.0	0.476
185.1	0.484
215.3	0.493
255.5	0.515
311.5	0.534
32[illegible]	0.543
446.4	0.553
DATA SET 44	
T = 29[illegible]	
132.5	0.013
14[illegible]	0.003
152.4	0.012
161.2	0.019
170.5	0.057
205.3	0.112
230.5	0.157
253.[illegible]	0.219
305.3	0.276
374.5	0.359
534.7	0.498

TABLE 11. PEAK POSITIONS (λ_{max}) IN μm AND HALF-WIDTHS (W) IN eV FOR THE F, R, M, AND N ABSORPTION BANDS IN LITHIUM FLUORIDE*

Interionic dist., d (Å)	Temp.	F band λ_{max}	F band W	R_1 band λ_{max}	R_2 band λ_{max}	M band λ_{max}	M band W	N bands λ_{max}
2.01	RT	(0.254)†		(0.295)	(0.320)	(0.416)		
		0.245	0.74	0.306	0.376	0.444		N_1: 0.520
		0.248	0.76	0.308	0.378	0.445		N_2: 0.540
		0.249	0.7	0.310	0.380	0.447		
		0.250		0.313		0.450		
		0.257		0.316				
	NT	0.242	0.47					
	HT	0.243	0.58					
			0.43					

* Values were taken from Ref. [69].

† Values given in parentheses are calculated from the Ivey relations [70].

F band $\lambda_{max} = 703\ d^{1.84}$ for NaCl structure, $\lambda_{max} = 251\ d^{2.5}$ for CsCl structure.

R_1 band $\lambda_{max} = 816\ d^{1.84}$

R_2 band $\lambda_{max} = 884\ d^{1.84}$

M band $\lambda_{max} = 1400\ d^{1.56}$

TABLE 12. RECOMMENDED VALUES ON ABSORPTION COEFFICIENT OF LITHIUM FLUORIDE IN IR REGION AT 300 K

ν, cm^{-1}	λ, μm	Absorption Coefficient, cm^{-1}	
		Intrinsic*	Observed† (Selected)
1.100E+03	9.09	1.6E+1	
1.191E+03	8.40	8.9E+0	9.9E+0
1.240E+03	8.06	6.5E+0	7.8E+0
1.292E+03	7.74	4.6E+0	5.6E+0
1.346E+03	7.43	3.2E+0	3.6E+0
1.395E+03	7.17	2.3E+0	2.5E+0
1.449E+03	6.90	1.6E+0	1.5E+0
1.497E+03	6.68	1.2E+0	1.3E+0
1.550E+03	6.45	8.6E-1	9.3E-1
1.605E+03	6.23	6.0E-1	7.0E-1
1.658E+03	6.03	4.2E-1	5.0E-1
1.701E+03	5.88	3.2E-1	3.4E-1
1.751E+03	5.71	2.3E-1	2.4E-1
1.802E+03	5.55	1.6E-1	1.7E-1
1.855E+03	5.39	1.1E-1	1.1E-1
1.887E+03	5.30	9.5E-2	
1.901E+03	5.26	8.7E-2	8.2E-2
1.949E+03	5.13	6.3E-2	6.2E-2
2.004E+03	4.99	4.4E-2	4.2E-2
2.101E+03	4.76	2.3E-2	2.1E-2
2.203E+03	4.54	1.2E-2	1.1E-2
2.304E+03	4.34	6.2E-3	5.9E-3
2.400E+03	4.17	3.3E-3	
2.500E+03	4.00	1.7E-3	
2.600E+03	3.85	9.0E-4	
2.632E+03	3.80	7.3E-4	
2.700E+03	3.70	4.7E-4	
2.800E+03	3.57	2.4E-4	
2.900E+03	3.45	1.2E-4	
3.000E+03	3.33	6.6E-5	
3.704E+03	2.70	6.7E-7	

*Intrinsic values were calculated according to Eq. (23) with uncertainties about ±10%.

†Values in this column are the total absorption coefficient which are either lowest reported or those used to define the constants in Eq. (23). Uncertainties of these values are about ±10%.

3.2. Sodium Fluoride, NaF

Sodium fluoride is less hygroscopic than the other alkali halides, with the exception of lithium fluoride. It is transparent over the same range of wavelengths as calcium fluoride, a wider range than that of lithium fluoride. It is deficient in its mechanical properties, but it has some uses in cases where a particularly low refractive index is desired. It can be easily evaporated as a thin film and can be used as reflection-reducing coating.

Available data on the refractive index of NaF are not abundant, mainly because of its mechanical weakness. The ultraviolet absorption region was investigated by Sano [71], the transparent region by Hohls [29], Harting [30], Kublitzky [72], and Spangenberg [73], and the infrared region by Randall [74]. Zarzyski and Naudin [75] obtained n for molten NaF for the Hg green line at a temperature of 1273 K.

Li [33], in 1976, reduced the then available experimental data on the refractive index to a common temperature of 293 K and after careful evaluation and analysis adopted a Sellmeier type dispersion equation to calculate the refractive index at 293 K in the wavelength range 0.15-17.0 μm:

$$n = 1.41572 + \frac{0.32785\,\lambda^2}{\lambda^2 - (0.117)^2} + \frac{3.18248\,\lambda^2}{\lambda^2 - (40.57)^2} \qquad (24)$$

where λ is in units of μm.

Investigations of absorption coefficient for practical applications are generally classified into three wavelength regions: the ultraviolet and the infrared limits of transparency, and the transparent regions. In the ultraviolet region, the purposes of the studies were to investigate the exciton states in the crystal and to determine the Urbach-rule parameters.

Tomiki and Miyata [37] performed reflectivity and absorption measurements in the intrinsic wavelength region of cleaved NaF samples to clarify the thermal and spectral dependences of absorptions in the tail region. Effects induced by the ultraviolet radiation were observed. Sizable changes in transmission and reflectivity were observed during the course of uv exposure, suggesting the specimen underwent some kind of damage by the radiation. For this reason, experiments were conducted on freshly cleaved specimens. The absorption spectra of a Harshaw NaF plate of optical quality, displayed broad absorptions

around 0.14 μm due to impurities. However, it showed an exponential absorption tail in the highest energy end of the spectrum, 0.125-0.127 μm, where absorption coefficients were higher than 50 cm^{-1}. Since the tail spectra of intrinsic exciton lines as well as of impurity-induced exciton lines equally obey the Urbach rule, the fact alone that a given tail obeys the Urbach rule does not always constitute in itself a criterion with which the tail can be judged as intrinsic or extrinsic. As evidenced by the broad absorption band around 0.14 μm, the observed tail of this specimen can be regarded as an impurity absorption tail. Sano [71] also investigated the Harshaw NaF single crystals at 78 and 300 K in the spectral region 0.104 to 0.21 μm. Results similar to that of Tomiki and Miyata were observed; namely, broad and prominent impurity absorptions followed by the extrinsic exponential tail. The dependence of the experimental band tail on temperature was compared with the theoretical curves for the intrinsic Urbach tails:

$$\alpha = \alpha_o \exp[-\sigma_s(T)(E_o-E)/kT] \tag{25}$$

and

$$\sigma_s(T) = \sigma_{so} \frac{2kT}{hf} \tanh \frac{hf}{2kT}$$

The constants, E_o and α_o, are the coordinates of the theoretical cross-over point. Sano estimated cross-over point for intrinsic Urbach tail at (10.70 eV, 10^{10} cm^{-1}), σ_{so} = 0.69 and hf = 16.5 meV. Chemically purified and zone refined NaF single crystals were prepared and measured by Földvari et al. [76] in the vacuum uv region at temperatures 100 K, 190 K, and 298 K. The reduction of concentration of OH^-, Cl^-, and Br^- impurities, through the purification process, resulted in the low absorption in the region of 0.13 to 0.16 μm. The specimens were placed behind the exist slit of the optical system in order to avoid the irradiation effects. Their experimental results indicated a theoretical cross-over point at (10.70 eV, 10^9 cm^{-1}) in agreement with Sano's estimation. As the extrapolated experimental absorption curves directed towards a common cross-over point, even at low temperatures, they concluded that the absorption is intrinsic.

Tomiki et al. [77] reported absorption coefficients of NaF at 29 K on the lower energy side of the lowest-energy exciton peak. In this spectral region, absorption rises with increasing energy first exponentially and subsequently non-exponentially forming the lower energy branch of the asymmetric

Lorentzian shape of the main peak. This feature owes its origin to the fluorine ion.

In the laser wavelength region, Harrington and Hass [78] investigated the temperature dependence of multiphonon absorption at 10.6 μm from room temperature to 1110 K for NaF samples using transmission measurements with a laser and power meter. All measurements were carried out inside a stabilized oven on samples polished mechanically, followed by chemical polishing. It was observed that the absorption coefficient increases monotonically and smoothly with temperature and appeared nearly as a straight line on logarithmic scale, as anticipated for the near-intrinsic abosrption of the crystal. Since the absorption levels of NaF at 10.6 μm are in the order of 1 cm^{-1}, it is sufficiently high to be ascribed to intrinsic behavior.

Pohl and Meier [79] studied the absorption at the wavelengths 9.3 μm (1020 cm^{-1}) and 10.6 μm (943.4 cm^{-1}) in the temperature range from 4 to 400 K on two samples of different purity. One was grown by standard techniques, with exposure to air, the other was grown in an argon atmosphere. Thus the main difference between the two samples was the concentrations of oxygen-containing impurities, whose effects on the absorption coefficient were revealed by an almost temperature independent amount of 0.25 cm^{-1} higher at 10.6 μm and by 0.30 cm^{-1} at 9.3 μm. Being about of the same order of magnitude as the total absorption, the impurity induced absorption masks the intrinsic temperature dependence of the impure sample in the low temperature region. In the high temperature region, however, the discrepancies between the two samples became less significant as the total absorption is considerably higher than the impurity absorption. As a consequence, data from both of the samples agreed reasonably well with the results of Harrington and Hass [78] which are slightly larger by an almost constant difference of $\Delta\alpha = 0.09$ cm^{-1} than those of the second sample. Similarly, at 9.3 μm, Klier's results [41] are in line with the above mentioned data. At both wavelengths, three distinct temperature dependencies can be clearly observed: (i) a constant low-temperature absorption in the region $T \lesssim 150$ K, indicating negligible occupation of phonon levels, (ii) the increase of absorption in the region >150 indicating phonon population rising, (iii) eventual compliance to the power-law, increasing at $T > T_{Debye}$.

The infrared multiphonon spectrum of many ionic crystals is characterized by a uniform, almost exponential, decay of absorption with frequency. A key

to the experimental identification of the various multiphonon processes is the temperature dependence of the absorption. The larger the number of phonons participating, the steeper the increase of absorption with temperature. McNelly and Pohl [80], in an attempt to split the exponential wing of the restrahlen band of NaF into the component phonon absorptions, systematically measured absorption coefficients in the range 6.67 to 16.67 μm and 100 to 850 K. Extremely pure samples, which were believed to be intrinsic as evidenced by the very small absorption at high frequencies, were employed. Although their studies were able to separate the resultant absorption spectrum into component phonons, the observed absorption spectrum does not indicate distinct peaks.

Figures 9 to 12 represent the available data. The pertinent information on each data set and the corresponding original values are given in Tables 13 to 16. In addition, for completeness and comparison, available information and data on the reflectivity and transmission are also presented in the same manner (in Figures 13 and 14 and Tables 17 to 20). For the visible and near visible regions, Table 21 gives the spectral positions of the well-known color centers. Noticeable absorptions are likely to occur at these centers when the crystal is exposed to ultraviolet, x-ray, or high energy radiation. However, these absorption bands may disappear at high temperatures or by appropriate radiation exposure, as a result of the so-called "thermal and optical bleaching."

In the multiphonon absorption region (shown in Figure 11), the absorption coefficients vary linearly with wavenumber in the semi-log plot indicating an exponential relation

$$\alpha = \alpha_o e^{-\nu/\nu_o} \tag{26}$$

In this region, Hohls [29] measured absorption coefficient of NaF for the spectral range from 7.5 to 24.0 μm at room temperature. Klier [41] reported his results on NaF in the range 7.9 to 19.1 μm at temperatures 79 K, 293 K, and 573 K. When compared with Hohl's results, a close agreement is observed. However, we found that their results were not adequate to define the constants in Eq. (26). It was based on the results of McNelly and Pohl [80], the constants were found to be ν_o = 79.5 cm^{-1} and α_o = 6.1053 x 10^4 cm^{-1}. Details of this finding are given in the section entitled "Summary of Results and Recommendations."

The recommended values given in Table 22 were calculated according to Eq. (26). It appears that NaF has high intrinsic absorption at 10.6 μm. However, if Eq. (26) holds in the region <5 μm, the intrinsic absorption there is lower than 10^{-4} cm. However, like most optical crystals, one expects to observe an absorption band in the range between 2.6 to 2.8 μm due to the hydroxyl ions in the crystal. This absorption band can be eliminated through improved crystal growing techniques. It should be noted that the values in the column "intrinsic" are the lowest limits that one can obtain for ideal samples. In practice, the observed values are generally higher than the limiting values at low absorption levels. Unless values are reported in the "observed" column, the limiting values are considered as guidelines for estimation and investigation.

Although it was not the intent of this work to compile and evaluate the absorption data in the vacuum ultraviolet region, for the purpose of providing the reader with a total picture of the available absorption data, a plot of the available data in this region is given in the Appendix of this report.

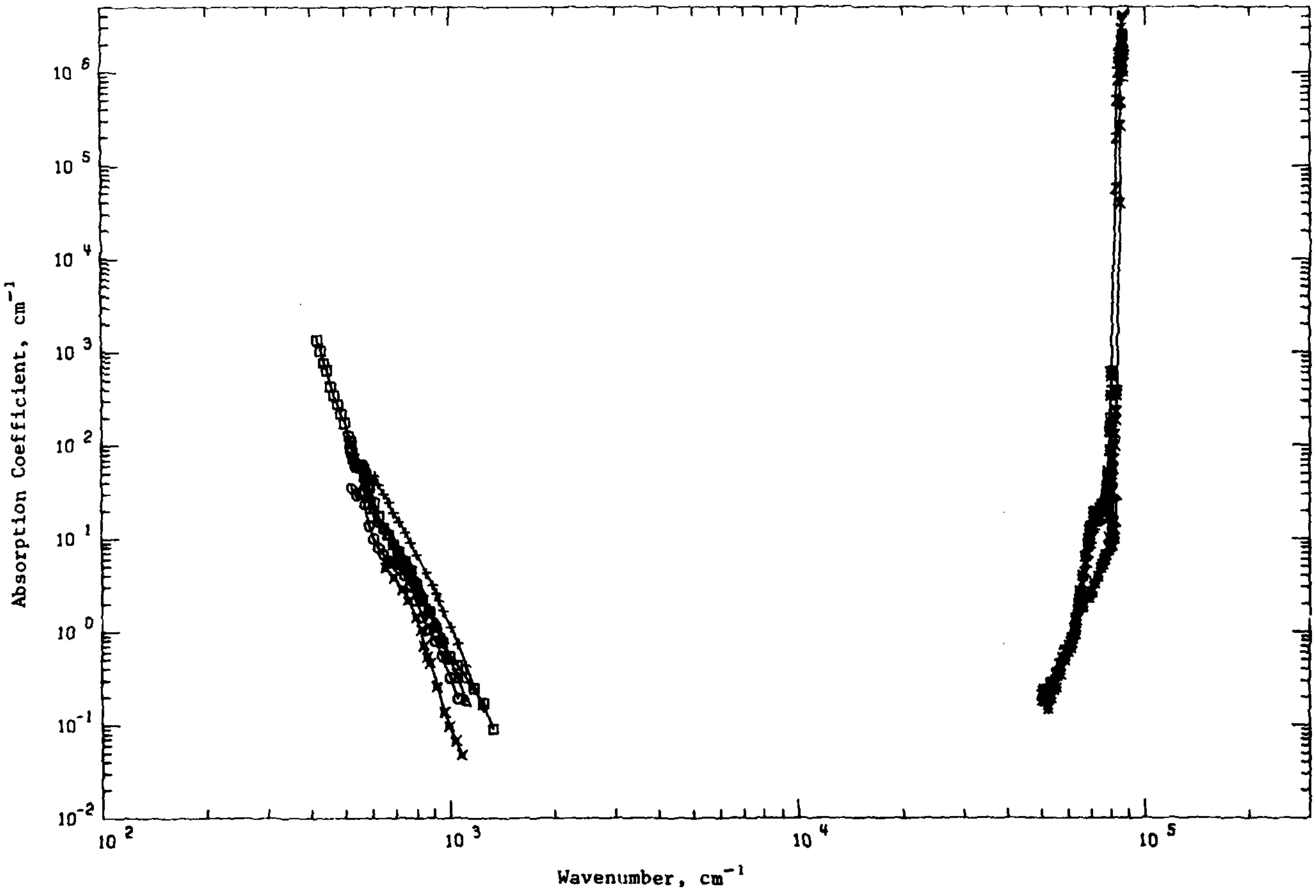

Figure 9. Absorption Coefficient of Sodium Fluoride (Wavenumber Dependence)

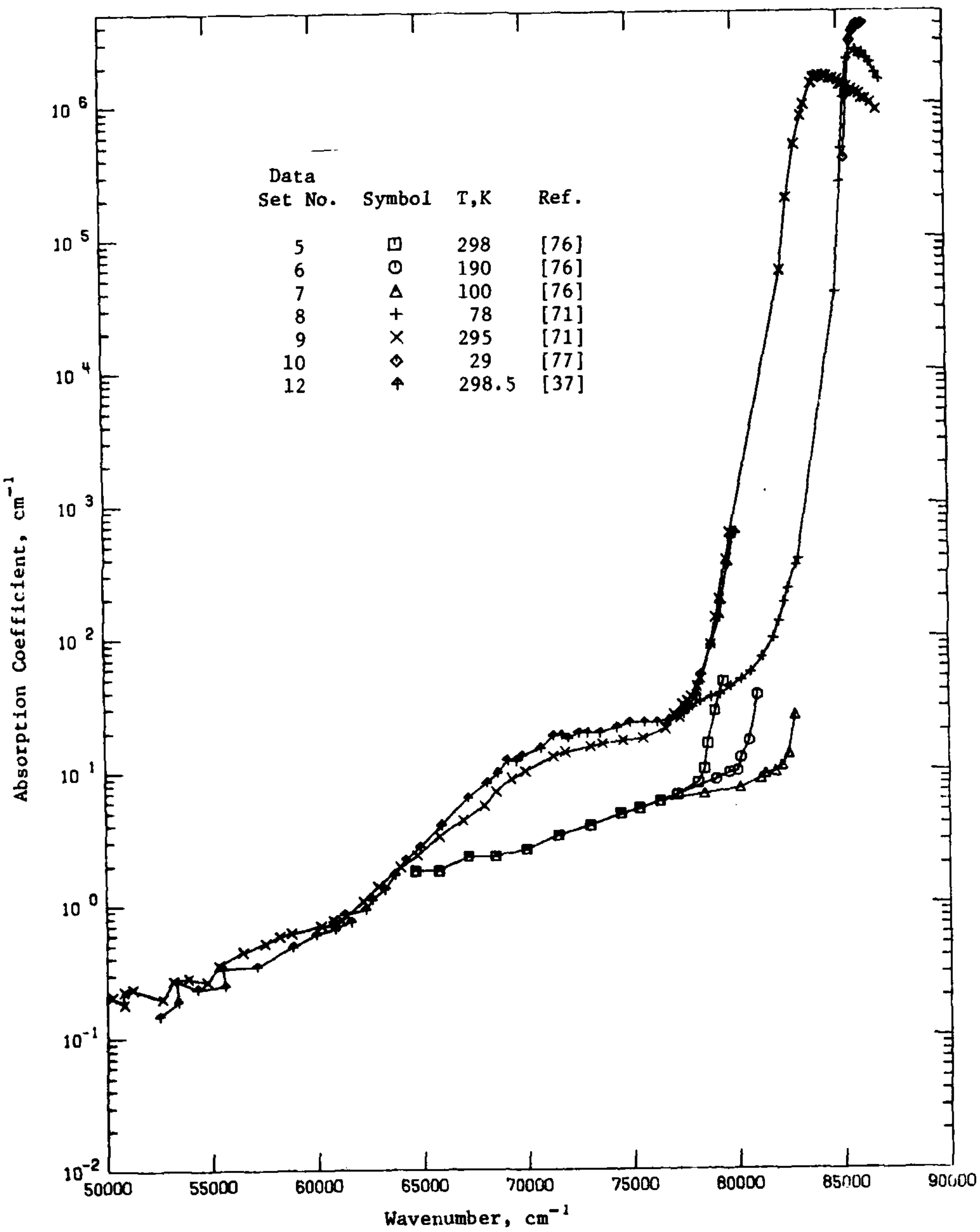

Figure 10. Absorption Coefficient of Sodium Fluoride in the Urbach Tail Region

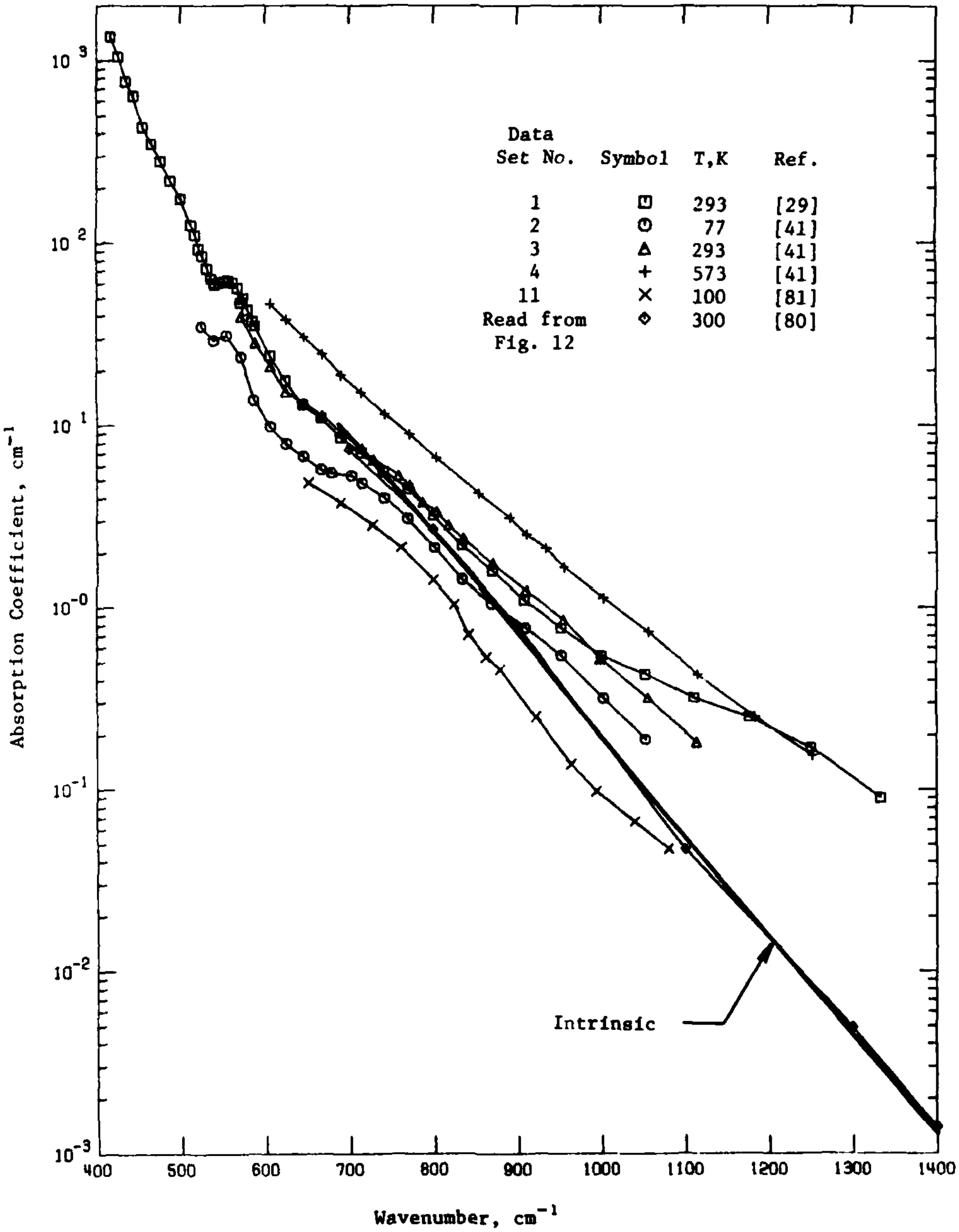

Figure 11. Absorption Coefficient of Sodium Fluoride in the Multiphonon Region

TABLE 13. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF SODIUM FLUORIDE (Wavenumber Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	29	Hohls, H.W.	1936	T	$41.6x10^{2}-1.34x10^{3}$	293	Crystal; grown by the Kyropoulos method; 14 plate specimens of thicknesses from 0.024 to 10.62 mm; absorption coefficients determined from transmission measurements; data extracted from a figure; temperature not specified, 293 K assumed.
2	41	Klier, M.	1958	R	$5.24x10^{2}-1.06x10^{3}$	77	Crystal; absorption-coefficient data deduced from reflectivity and transmittance measurements on specimens of various thicknesses; data extracted from a figure.
3	41	Klier, M.	1958	R	$5.7x10^{2}-1.12x10^{3}$	293	Same as above.
4	41	Klier, M.	1958	R	$6.06x10^{2}-1.26x10^{3}$	573	Same as above.
5	76	Földvari, I., Yoslka, K., and Raksanyi, K.	1974	R	$6.46x10^{4}-7.94x10^{4}$	298	Pure single crystals; chemically purified and zone refined; freshly cleaved specimens of 0.2-6 mm thick; absorption coefficient data extracted from a figure.
6	76	Földvari, I., et al.	1974	R	$6.46x10^{4}-8.1x10^{4}$	190	Above specimen and conditions except at a lower temperature.
7	76	Földvari, I., et al.	1974	R	$6.46x10^{4}-8.3x10^{4}$	100	Above specimen and conditions except at a lower temperature.
8	71	Sano, R.	1969	R	$7.66x10^{4}-8.7x10^{4}$	78	Single crystal; obtained from the Harshaw Chemical Co., cleaved specimens of 10 mm x 15 mm x 0.17-2.50 mm, approximately; a thinner specimen of 0.08 mm thickness used for absorption measurement in the range of absorption coefficient as high as 10^{2} cm^{-1} - 5 x 10^{5} cm^{-1}; data extracted from a figure.
9	71	Sano, R.	1969	R	$5.0x10^{4}-8.7x10^{4}$	295	Similar to above except at a high temperature.
10	77	Tomiki, T., Miyata, T., and Tsukamoto, H.	1974	R	$8.53x10^{4}-8.62x10^{4}$	29	Single crystals obtained from the Harshaw Chemical Co.; absorption coefficients deduced from reflection spectrum; data extracted from a curve.
11	81	Beck, H. and Pohl, R.W.	1975	T	$6.5x10$ $-1.1x10^{3}$	100	Single crystal of extreme purity; no indication of any extrinsic absorption; specimens of 54.98 mm and 3.82 mm thick; absorption measured by means of infrared spectrophotometer; data extracted from a figure.
12	37	Tomiki, T. and Miyata, T.	1969	Z	$5.2x10^{4}-8.0x10^{4}$	300	Single crystal; ultraviolet quality from the Harshaw Chemical Co.; freshly cleaved specimens for absorption coefficient below 100 cm^{-1}; specimens for higher absorption prepared in high vacuum by melting the flakes of crystals between two plates of glassy carbon and pressed; reflection and transmission spectra obtained and absorption coefficients determined; data extracted from a figure.

TABLE 14. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF SODIUM FLUORIDE (Wavenumber Dependence)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

ν	α
DATA SET 1	
T = 293.0	
1.333E+3	[illegible]
1.250E+3	[illegible]
1.176E+3	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
9.524E+2	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
8.333E+2	[illegible]
[illegible]	[illegible]
7.692E+2	[illegible]
7.467E+2	[illegible]
7.143E+2	[illegible]
6.897E+2	[illegible]
6.667E+2	[illegible]
6.452E+2	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
5.882E+2	[illegible]
5.859E+2	[illegible]
5.797E+2	[illegible]
5.737E+2	[illegible]
5.714E+2	[illegible]
5.675E+2	[illegible]
5.618E+2	[illegible]
5.559E+2	[illegible]
5.556E+2	[illegible]
5.513E+2	[illegible]
5.483E+2	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
5.359E+2	5.37[illegible]E+1
5.313E+2	7.250E+1
5.263E+2	[illegible]
5.222E+2	9.23[illegible]E+1
5.192E+2	[illegible]
5.128E+2	[illegible]
[illegible]	[illegible]
DATA SET 1 (CONT.)	
4.873E+2	2.200E+2
4.762E+2	2.3[illegible]E+2
4.651E+2	3.5[illegible]E+2
4.545E+2	4.3[illegible]E+2
4.444E+2	6.4[illegible]E+2
4.348E+2	7.7[illegible]E+2
4.255E+2	1.050E+3
4.167E+2	1.350E+3
DATA SET 2	
T = 77.0	
1.053E+3	1.556E-1
[illegible]	3.18[illegible]E-1
9.524E+2	5.445E-1
9.099E+2	7.766E-1
8.696E+2	1.053E+0
8.333E+2	1.432E+0
8.006E+2	[illegible]
7.699E+2	3.073E+0
7.413E+2	4.011E+0
[illegible]	4.327E+0
[illegible]	5.321E+0
[illegible]	5.487E+0
[illegible]	5.747E+0
6.460E+2	6.783E+0
6.254E+2	7.932E+0
6.060E+2	9.4[illegible]E+0
5.975E+2	1.375E+1
5.718E+2	2.365E+1
5.540E+2	3.113E+1
5.394E+2	2.932E+1
5.249E+2	3.478E+1
DATA SET 3	
T = 293.0	
1.114E+3	1.8[illegible]E-1
1.056E+3	3.195E-1
9.99[illegible]E+2	5.2[illegible]E-1
DATA SET 3 (CONT.)	
9.551E+2	9.575E-1
9.107E+2	1.243E+0
8.703E+2	1.743E+0
8.361E+2	2.345E+0
8.183E+2	2.545E+0
8.032E+2	3.373E+0
7.868E+2	3.794E+0
7.716E+2	4.684E+0
7.582E+2	5.318E+0
7.289E+2	6.514E+0
7.153E+2	7.477E+0
6.9[illegible]E+2	9.218E+0
6.68[illegible]E+2	1.132E+1
6.464E+2	1.330E+1
6.254E+2	1.525E+1
6.004E+2	2.115E+1
5.886E+2	2.812E+1
5.718E+2	3.948E+1
DATA SET 4	
T = 573.0	
1.252E+3	1.537E-1
1.163E+3	2.491E-1
1.116E+3	4.279E-1
1.057E+3	7.367E-1
[illegible]	1.123E+0
9.551E+2	1.664E+0
9.337E+2	2.116E+0
9.116E+2	2.529E+0
8.913E+2	3.123E+0
8.541E+2	4.253E+0
8.032E+2	6.669E+0
7.71[illegible]E+2	8.559E+0
7.419E+2	1.157E+1
7.149E+2	1.518E+1
6.911E+2	1.833E+1
6.634E+2	2.456E+1
6.468E+2	3.249E+1
6.258E+2	3.799E+1
DATA SET 4 (CONT.)	
[illegible]	4.659E+1
DATA SET 5	
T = 298.0	
7.937E+4	4.660E+1
7.893E+4	2.810E+1
7.862E+4	1.59[illegible]E+1
7.843E+4	1.030E+1
7.812E+4	8.100E+0
7.716E+4	6.600E+0
7.634E+4	5.900E+0
7.536E+4	5.200E+0
7.446E+4	4.900E+0
7.299E+4	3.900E+0
7.148E+4	3.300E+0
6.998E+4	2.600E+0
6.849E+4	2.300E+0
6.72[illegible]E+4	2.300E+0
6.579E+4	1.800E+0
6.464E+4	1.800E+0
DATA SET 6	
T = 196.0	
8.097E+4	3.650E+1
8.058E+4	1.070E+1
8.029E+4	1.250E+1
8.00[illegible]E+4	9.900E+0
7.952E+4	9.700E+0
7.899E+4	8.600E+0
7.716E+4	6.600E+0
7.634E+4	5.900E+0
7.536E+4	5.200E+0
7.446E+4	4.800E+0
7.299E+4	3.900E+0
7.148E+4	3.300E+0
6.998E+4	2.600E+0
6.849E+4	2.300E+0
6.721E+4	2.300E+0
DATA SET 6 (CONT.)	
6.579E+4	1.800E+0
6.464E+4	1.800E+0
DATA SET 7	
T = 100.0	
8.271E+4	2.590E+1
8.244E+4	1.330E+1
8.220E+4	1.690E+1
8.177E+4	9.800E+0
8.130E+4	9.400E+0
8.110E+4	8.700E+0
8.013E+4	7.400E+0
7.843E+4	6.700E+0
7.634E+4	5.900E+0
7.536E+4	5.200E+0
7.446E+4	4.800E+0
7.299E+4	3.900E+0
7.145E+4	3.300E+0
6.998E+4	2.600E+0
6.849E+4	2.300E+0
6.723E+4	2.300E+0
6.579E+4	1.800E+0
6.464E+4	1.800E+0
DATA SET 8	
T = 79.0	
8.699E+4	1.528E+6
8.683E+4	1.659E+6
8.658E+4	2.032E+6
8.641E+4	2.179E+6
8.621E+4	2.410E+6
8.610E+4	2.243E+6
8.585E+4	2.523E+6
8.548E+4	2.159E+6
8.531E+4	1.112E+6
8.518E+4	4.656E+5
8.510E+4	2.630E+5
8.482E+4	3.89[illegible]E+4
DATA SET 8 (CONT.)	
8.291E+4	3.8[illegible]2E+2
8.281E+4	3.420E+2
8.243E+4	2.291E+2
8.227E+4	1.325E+2
[illegible]	1.3[illegible]E+2
8.17[illegible]E+4	5.817E+1
8.123E+4	7.079E+1
8.065E+4	5.445E+1
8.023E+4	4.808E+1
7.972E+4	4.246E+1
7.923E+4	3.733E+1
7.883E+4	3.595E+1
7.827E+4	3.236E+1
7.788E+4	3.334E+1
7.771E+4	2.951E+1
7.748E+4	2.655E+1
7.661E+4	2.228E+1
DATA SET 9	
T = 295.0	
8.684E+4	8.995E+5
8.650E+4	1.019E+6
8.635E+4	[illegible]
8.617E+4	[illegible]
8.603E+4	1.166E+6
8.594E+4	1.219E+6
8.569E+4	1.271E+6
8.544E+4	1.337E+6
8.529E+4	1.400E+6
8.514E+4	1.415E+6
8.50[illegible]E+4	1.527E+6
8.482E+4	1.547E+6
8.466E+4	1.545E+6
8.452E+4	1.629E+6
8.437E+4	1.622E+6
8.416E+4	1.622E+6
8.403E+4	1.585E+6
8.391E+4	1.549E+6
8.379E+4	1.426E+6

TABLE 14. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF *SODIUM FLUORIDE* (Wavenumber Dependence) (continued)

ν	α	ν	α	ν	α	ν	α
DATA SET 9(CONT.)		DATA SET 9(CONT.)		DATA SET 11(CONT.)		DATA SET 12(CONT.)	
8.543E+4	3.313E+5	5.750E+4	5.152E-1	9.640E+2	1.380E-1	7.430E+4	2.120E+1
8.327E+4	5.165E+5	5.645E+4	4.466E-1	9.940E+2	9.770E-2	7.490E+4	2.310E+1
8.235E+4	4.943E+5	5.532E+4	3.548E-1	1.040E+3	6.700E-2	7.560E+4	2.310E+1
8.262E+4	1.977E+5	5.470E+4	2.686E-1	1.080E+3	4.740E-2	7.620E+4	2.310E+1
8.200E+4	5.023E+4	5.387E+4	2.610E-1			7.630E+4	2.410E+1
7.972E+4	6.011E+2	5.315E+4	2.703E-1	DATA SET 12		7.700E+4	2.860E+1
7.961E+4	7.410E+2	5.250E+4	1.395E-1	T = 293.5		7.810E+4	3.690E+1
7.921E+4	1.932E+2	5.121E+4	2.305E-1			7.820E+4	4.390E+1
7.903E+4	1.445E+2	5.081E+4	2.259E-1	5.250E+4	1.473E-1	7.830E+4	5.200E+1
7.880E+4	3.790E+1	5.031E+4	1.819E-1	5.340E+4	1.910E-1	7.890E+4	8.720E+1
7.829E+4	4.553E+1	5.024E+4	2.060E-1	5.330E+4	2.080E-1	7.920E+4	1.390E+2
7.812E+4	4.235E+1			5.430E+4	2.360E-1	7.930E+4	1.860E+2
7.785E+4	3.557E+1	DATA SET 1[illegible]		5.560E+4	2.460E-1	7.950E+4	3.430E+2
7.771E+4	3.327E+1	T = [illegible]		5.650E+4	3.320E-1	7.980E+4	5.490E+2
7.740E+4	3.119E+1			5.710E+4	3.460E-1	8.000E+4	5.980E+2
7.727E+4	2.900E+1	8.621E+4	3.339E+6	5.850E+4	4.930E-1		
7.702E+4	2.067E+1	8.610E+4	4.009E+6	5.990E+4	6.040E-1		
7.651E+4	2.070E+1	8.614E+4	3.930E+6	6.080E+4	6.590E-1		
7.596E+4	1.754E+1	8.611E+4	3.852E+6	6.100E+4	7.490E-1		
7.450E+4	1.690E+1	8.601E+4	3.882E+6	6.130E+4	8.520E-1		
7.363E+4	1.607E+1	8.592E+4	3.520E+6	6.230E+4	9.280E-1		
7.310E+4	1.535E+1	8.591E+4	3.056E+6	6.260E+4	1.100E+0		
7.149E+4	1.343E+1	8.575E+4	3.467E+6	6.320E+4	1.310E+0		
7.129E+4	1.300E+1	8.562E+4	2.965E+6	6.370E+4	1.690E+0		
6.992E+4	1.102E+1	8.545E+4	1.175E+6	6.420E+4	2.190E+0		
6.927E+4	8.790E+0	8.530E+4	3.308E+5	6.490E+4	2.710E+0		
6.899E+4	7.047E+0			6.590E+4	3.980E+0		
6.733E+4	5.595E+0	DATA SET 11		6.720E+4	6.350E+0		
6.634E+4	4.315E+0	T = [illegible]		6.810E+4	8.250E+0		
6.531E+4	3.265E+0			6.860E+4	9.790E+0		
6.470E+4	2.355E+0	6.920E+2	4.860E+0	6.910E+4	1.210E+1		
6.349E+4	1.923E+0	6.940E+2	3.790E+0	6.950E+4	1.210E+1		
6.290E+4	1.337E+0	7.050E+2	2.850E+0	6.990E+4	1.320E+1		
6.218E+4	1.006E+0	7.610E+2	2.140E+0	7.070E+4	1.560E+1		
6.113E+4	7.025E-1	7.990E+2	1.420E+0	7.130E+4	1.860E+1		
6.073E+4	7.095E-1	8.250E+2	1.040E+0	7.170E+4	1.960E+1		
6.073E+4	6.950E-1	8.420E+2	7.110E-1	7.200E+4	1.780E+1		
6.016E+4	6.982E-1	9.030E+2	5.360E-1	7.250E+4	1.940E+1		
5.971E+4	6.137E-1	8.340E+2	4.580E-1	7.290E+4	1.940E+1		
5.819E+4	5.834E-1	9.220E+2	2.510E-1	7.350E+4	1.940E+1		

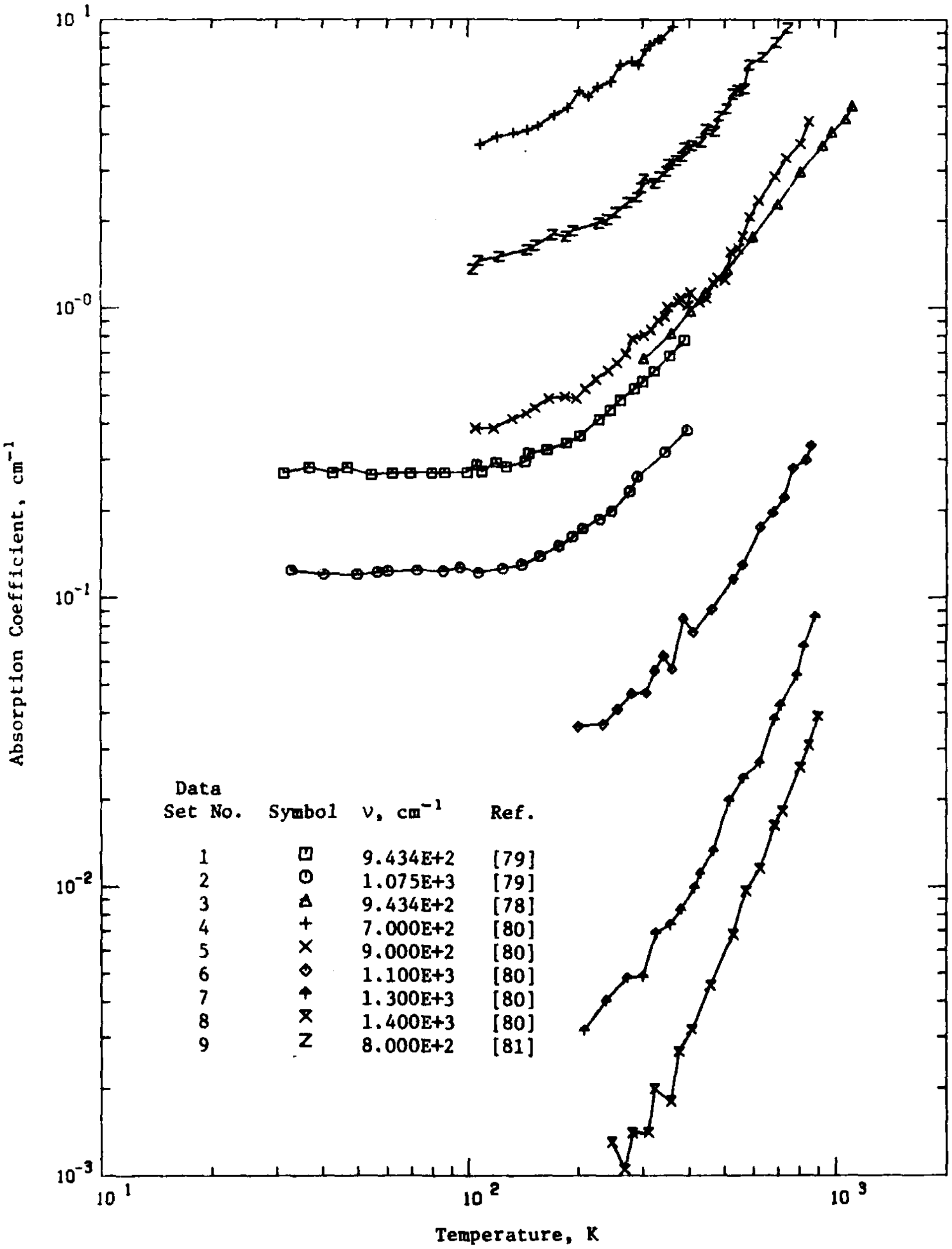

Figure 12. Absorption Coefficient of Sodium Fluoride (Temperature Dependence)

TABLE 15. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF SODIUM FLUORIDE (Temperature Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	79	Pohl, D.W. and Meier, P.F.	1974	T	943.2	31-390	Single crystal; made from Merck Suprapur NaF; grown in an argon atmosphere; specimen configurations and experimental details not given; absorption coefficient obtained; data extracted from a figure.
2	79	Pohl, D.W. and Meier, P.F.	1974	T	1.075×10^3	32-397	Same as above.
3	78	Harrington, J.A. and Hass, M.	1973	T	943.4	300-1110	Single crystal; specimen with surfaces mechanically and then chemically polished; absorption coefficients measured by transmission method with a laser and power meter; data extracted from a figure.
4	80	McNelly, T.F. and Pohl, D.W.	1974	T	700	108-843	Single crystals of extreme purity; specimens of 54.98 and 3.52 mm thick; no indication of any extrinsic absorption; absorption measured by means of infrared spectrophotometer; data extracted from a figure.
5	80	McNelly, T.F. and Pohl, D.W.	1974	T	900	105-849	Same as above.
6	80	McNelly, T.F. and Pohl, D.W.	1974	T	1100	200-861	Same as above.
7	80	McNelly, T.F. and Pohl, D.W.	1974	T	1300	207-881	Same as above.
8	80	McNelly, T.F. and Pohl, D.W.	1974	T	1400	221-899	Same as above.
9	81	Beck, H. and Pohl, D.W.	1975	T	800	103-845	Same as above and measured by McNelly and Pohl but reported in this reference.

TABLE 16. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF SODIUM FLUORIDE (Temperature Dependence)

(Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1})

DATA SET 1
ν = 9.434E+2

T	α
31.4	2.7[illegible]E-1
36.8	2.821E-1
42.7	2.700E-1
46.7	2.821E-1
54.3	2.563E-1
[illegible]	2.7[illegible]E-1
63.6	2.70[illegible]E-1
79.0	2.7[illegible]E-1
80.4	2.7[illegible]E-1
99.5	2.7[illegible]E-1
105.6	2.355E-1
109.3	2.738E-1
119.1	2.9[illegible]E-1
127.3	2.827E-1
143.2	2.95[illegible]E-1
146.2	3.105E-1
164.0	3.245E-1
185.7	3.43[illegible]E-1
202.2	3.634E-1
229.0	4.124E-1
243.7	4.45[illegible]E-1
250.5	4.823E-1
285.[illegible]	5.277E-1
303.5	5.564E-1
322.3	6.472E-1
350.7	6.929E-1
379.9	7.733E-1

DATA SET 2
ν = 1.075E+3

T	α
32.8	1.242E-1
40.2	1.219E-1
49.6	1.235E-1
56.4	1.225E-1
61.2	1.239E-1
72.6	1.242E-1
85.5	1.236E-1
95.0	1.265E-1

DATA SET 2(CONT.)

T	α
106.0	1.228E-1
124.4	1.262E-1
139.9	1.304E-1
150.6	1.394E-1
176.5	1.514E-1
192.2	1.63[illegible]E-1
205.5	1.738E-1
220.5	1.467E-1
246.5	1.395E-1
276.0	2.329E-1
293.3	2.013E-1
344.3	3.186E-1
390.2	3.777E-1

DATA SET 3
ν = 9.434E+2

T	α
321.9	6.682E-1
358.9	8.165E-1
405.5	9.794E-1
443.6	1.132E+0
504.1	1.358E+0
595.5	1.760E+0
690.0	2.291E+0
803.5	2.365E+0
922.5	3.664E+0
977.2	4.073E+0
1004.1	4.529E+0
1109.1	5.012E+0

DATA SET 4
ν = 7.0[illegible]E+2

T	α
100.0	3.693E+0
120.0	3.910E+0
133.0	4.030E+0
145.0	4.15[illegible]E+0
155.0	4.280E+0
172.0	4.670E+0
187.0	4.960E+0

DATA SET 4(CONT.)

T	α
201.0	5.060E+0
213.0	5.420E+0
226.0	5.830E+0
240.0	6.100E+0
26[illegible].0	6.960E+0
28[illegible].0	7.170E+0
292.0	6.960E+0
305.0	7.830E+0
314.0	8.180E+0
332.0	8.550E+0
337.0	8.550E+0
362.0	9.480E+0
373.0	1.010E+1
383.0	1.010E+1
394.0	1.170E+1
406.0	1.160E+1
430.0	1.160E+1
455.0	1.270E+1
462.0	1.370E+1
482.0	1.430E+1
510.0	1.500E+1
525.0	1.560E+1
546.0	1.630E+1
564.0	1.780E+1
539.0	1.890E+1
624.0	2.010E+1
639.0	2.360E+1
751.0	2.430E+1
819.0	2.910E+1
843.0	2.940E+1

DATA SET 5
ν = 9.[illegible]E+2

T	α
115.0	3.860E-1
118.0	3.860E-1
132.0	4.150E-1
144.0	4.340E-1
152.0	4.540E-1
166.0	4.880E-1

DATA SET 5(CONT.)

T	α
184.0	4.960E-1
197.0	4.890E-1
209.0	5.260E-1
224.0	5.660E-1
241.0	6.090E-1
255.0	6.400E-1
270.0	6.960E-1
282.0	7.630E-1
303.0	8.060E-1
316.0	8.430E-1
330.0	9.[illegible]70E-1
345.0	9.340E-1
350.0	1.010E+0
376.0	1.050E+0
381.0	1.060E+0
398.0	1.020E+0
404.0	1.130E+0
428.0	1.050E+0
447.0	1.080E+0
460.0	1.220E+0
482.0	1.270E+0
501.0	1.250E+0
522.0	1.560E+0
545.0	1.610E+0
561.0	1.780E+0
586.0	2.070E+0
620.0	2.360E+0
685.0	2.850E+0
736.0	3.310E+0
802.0	3.720E+0
849.0	4.440E+0

DATA SET 6
ν = 1.100E+3

T	α
199.8	3.590E-2
234.5	3.660E-2
256.6	4.130E-2
280.8	4.670E-2
307.2	4.710E-2

DATA SET 6(CONT.)

T	α
321.0	5.600E-2
342.9	6.310E-2
363.5	5.670E-2
386.7	8.470E-2
410.6	7.610E-2
462.9	9.130E-2
517.2	1.1[illegible]E-1
553.8	1.300E-1
625.5	1.750E-1
677.6	1.970E-1
725.3	2.220E-1
767.8	2.800E-1
831.8	2.990E-1
861.5	3.360E-1

DATA SET 7
ν = 1.300E+3

T	α
227.4	3.170E-3
239.0	4.020E-3
271.7	4.830E-3
300.2	4.880E-3
325.3	6.890E-3
355.9	7.300E-3
381.7	8.300E-3
413.5	9.940E-3
433.6	1.110E-2
466.2	1.330E-2
515.2	1.990E-2
563.7	2.390E-2
621.6	2.690E-2
681.7	3.800E-2
710.2	4.270E-2
786.5	5.410E-2
822.7	6.810E-2
883.6	8.560E-2

DATA SET 8
ν = 1.400E+3

T	α
221.1	9.730E-4
240.8	1.340E-3
267.4	1.450E-3
281.1	1.440E-3
310.7	1.410E-3
322.3	1.59[illegible]E-3
357.4	1.640E-3
375.7	2.670E-3
407.0	3.190E-3
459.8	4.530E-3
527.8	6.810E-3
571.8	9.620E-3
625.0	1.150E-2
654.5	1.630E-2
719.6	1.830E-2
802.5	2.590E-2
849.0	3.090E-2
895.5	3.890E-2

DATA SET 9
ν = 8.0[illegible]E+2

T	α
103.0	1.360E+0
107.0	1.460E+0
122.0	1.540E+0
145.0	1.640E+0
152.0	1.690E+0
170.0	1.8[illegible]E+0
185.0	1.7[illegible]E+0
193.0	1.860E+0
227.0	1.970E+0
24[illegible].0	2.030E+0
254.0	2.150E+0
273.0	2.320E+0
289.0	2.420E+0
297.0	2.610E+0
302.0	2.840E+0
324.0	2.720E+0
344.0	2.950E+0

TABLE 16. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF SODIUM FLUORIDE (Temperature Dependence) (continued)

T	α
DATA SET 9(CONT.)	
348.0	2.980E+0
353.0	3.160E+0
369.0	3.250E+0
385.0	3.350E+0
393.0	3.600E+0
403.0	3.660E+0
432.0	3.770E+0
444.0	4.170E+0
471.0	4.110E+0
494.0	4.630E+0
505.0	4.910E+0
527.0	5.520E+0
543.0	5.590E+0
567.0	5.770E+0
593.0	6.990E+0
635.0	7.400E+0
692.0	8.370E+0
743.0	9.370E+0
787.0	1.100E+1
845.0	1.260E+1

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ABSORPTION COEFFICIENT OF ALKALI HALIDES. PART I.(U)
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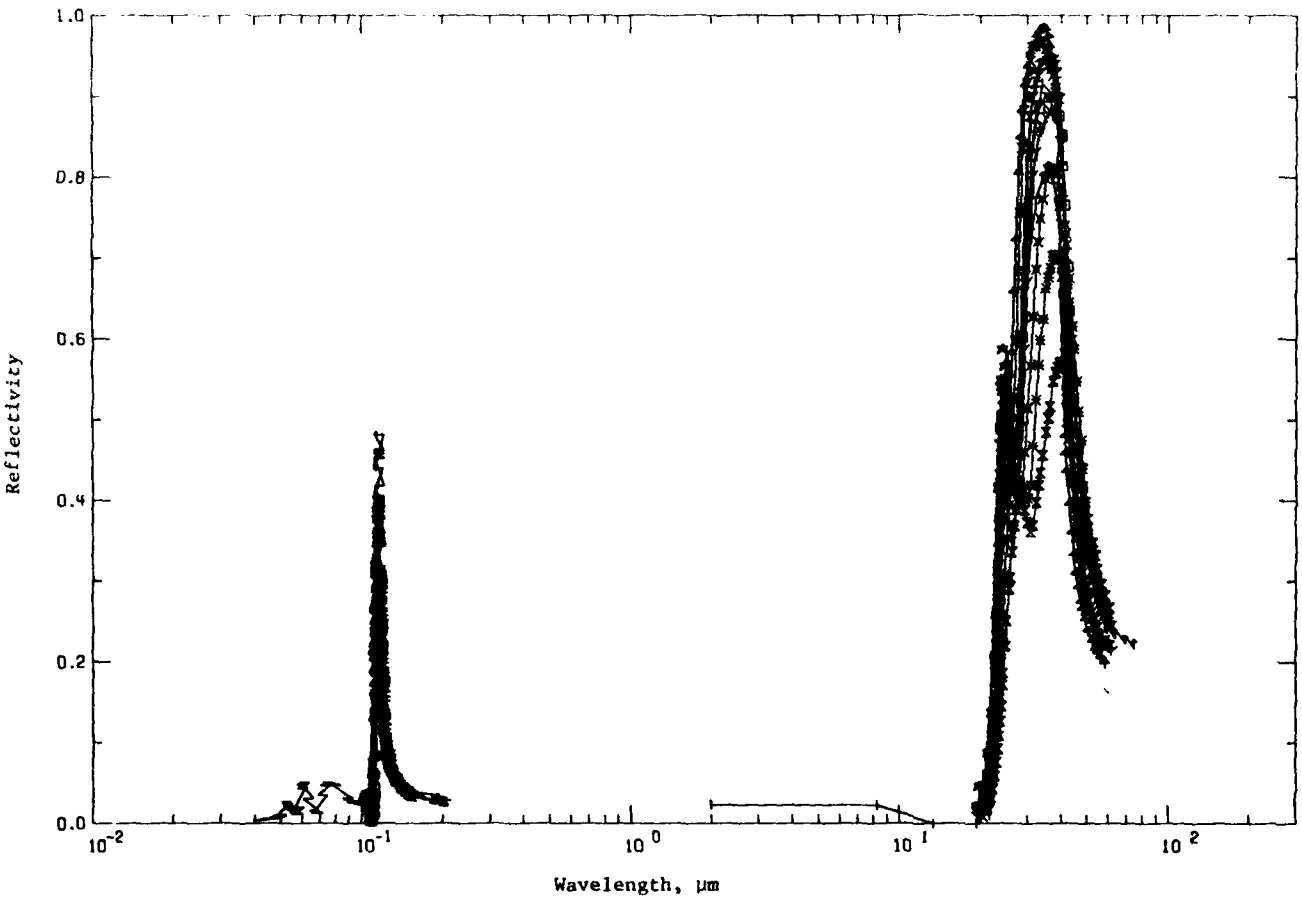

Figure 13. Reflectivity of Sodium Fluoride

TABLE 17. SUMMARY OF MEASUREMENTS ON THE REFLECTIVITY OF SODIUM FLUORIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	29	Hohls, H.W.	1936	R	19.8-54.1	293	Crystal; grown by the Kyropoulos method; specimen configuration and surface condition unspecified; normal reflectivity determined by using a freshly vacuum coated silver mirror as reference standard; data extracted from a figure; estimated uncertainty about ±10%; temperature was not given, 293 K assumed.
2	82	Roessler, D.M. and Walker, W.C.	1967	R	0.105-0.138	300	Bulk sodium fluoride; no information about the specimens given; reflection spectrum obtained; data extracted from a figure.
3	82	Roessler, D.M. and Walker, W.C.	1967	R	0.105-0.127	77	Same as above except at a lower temperature.
4	41	Klier, M.	1958	R	20.9-26.0	77	Crystal; specimen with top surface highly polished; reflection spectrum measured with a reference mirror made of German V_2A steel; data extracted from a figure.
5	41	Klier, M.	1958	R	20.5-26.0	293	Same as above.
6	41	Klier, M.	1958	R	21.4-26.0	573	Same as above.
7	83	Chang, I.F. and Mitra, S.S.	1972	R	19.5-58.2	132	Crystal; obtained from the Harshaw Chemical Co.; specimens with highly polished surface (with or without annealing) or freshly cleaved surface; reflection spectra measured and repeated several times and reproduced within 2% error in intensity and less than 1% error in band position; data extracted from a figure.
8	83	Chang, I.F. and Mitra, S.S.	1972	R	19.5-60.5	215	Same as above except at a higher temperature.
9	83	Chang, I.F. and Mitra, S.S.	1972	R	19.5-60.5	298	Same as above except at a higher temperature.
10	83	Chang, I.F. and Mitra, S.S.	1972	R	19.5-61.7	423	Same as above except at a higher temperature.
11	83	Chang, I.F. and Mitra, S.S.	1972	R	19.5-61.7	605	Same as above except at a higher temperature.
12	83	Chang, I.F. and Mitra, S.S.	1972	R	19.5-60.5	792	Same as above except at a higher temperature.
13	83	Chang, I.F. and Mitra, S.S.	1972	R	19.5-60.5	958	Same as above except at a higher temperature.
14	54	McCarthy, D.E.	1965	R	2.00-50.0	298	Synthetic crystal; 2.16 mm thick; polished to flatness of 10 fringes; 30° reflectivity measured with aluminum mirror as reference standard; data extracted from a curve.
15	84	Mitsuishi, A., Yamada, Y. and Yoshinay, H.	1962	R	19.9-51.6	300	Single crystal; near normal reflectivity; measured in vacuum with aluminum mirrors as reference standard; data extracted from a curve.

TABLE 17. SUMMARY OF MEASUREMENTS ON THE REFLECTIVITY OF SODIUM FLUORIDE (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
16	57	Rao, K.K., Moravec, T.J., Rife, J.C., and Dexter, R.N.	1975	R	0.044-0.207	30	Single crystal; obtained from the Harshaw Chemical Co.; cleaved specimen of 1 cm diameter and 3 mm thick; specimen kept in vacuum during reflectivity measurements; near normal reflectivity obtained; data extracted from a curve.
17	71	Sano, R.	1969	R	0.108-0.128	78	Single crystal; obtained from the Harshaw Chemical Co.; cleaved specimens of 10 mm x 15 mm x 0.17-2.50 mm approximately; near normal reflectivity obtained; data extracted from a figure.
18	71	Sano, R.	1969	R	0.099-0.210	295	Same as above except at a higher temperature.
19	61	Nakagawa, I.	1971	R	21.5-74.7	293	Single crystal; near normal reflectivity measurements made in a vacuum; data extracted from a curve.
20	37	Tomiki, T. and Miyata, T.	1969	R	0.11-0.16	273	Single crystal; obtained from the Harshaw Chemical Co.; freshly cleaved; normal reflectivity measured in vacuum; data extracted from a curve.

TABLE 18. EXPERIMENTAL DATA ON THE REFLECTIVITY OF SODIUM FLUORIDE

[Wavelength, λ, μm; Temperature, T, K; Reflectivity, ρ]

λ	ρ
DATA SET 1	
T = 293.0	
19.81	0.0156
20.70	0.0359
21.42	0.0500
21.87	0.0329
22.234	0.0[illegible]7
22.54	0.131
22.85	0.214
23.82	0.439
23.93	0.497
24.21	0.515
24.54	0.515
24.85	0.483
25.05	0.490
25.23	0.451
25.53	0.436
26.05	0.423
26.95	0.440
29.57	0.503
31.11	0.825
31.91	0.862
33.26	0.895
34.75	0.939
35.83	0.939
36.29	0.933
37.26	0.876
40.28	0.950
40.55	0.914
41.22	0.766
42.16	0.659
42.75	0.635
43.25	0.593
44.15	0.546
45.05	0.521
46.13	0.465
47.54	0.415
48.04	0.387
49.54	0.365
51.05	0.342
52.35	0.325

λ	ρ
DATA SET 1(CONT.)	
54.07	0.307
DATA SET 2	
T = 300.0	
0.1051	0.020
0.1056	0.028
0.1062	0.026
0.1067	0.026
0.1070	0.026
0.1073	0.026
0.1077	0.022
0.1082	0.019
0.1089	0.014
0.1094	0.009
0.1096	0.007
0.1101	0.005
0.1112	0.010
0.1116	0.021
0.1119	0.031
0.1120	0.037
0.1122	0.046
0.1124	0.060
0.1127	0.083
0.1132	0.125
0.1135	0.138
0.1137	0.153
0.1140	0.161
0.1146	0.186
0.1147	0.193
0.1149	0.202
0.1152	0.208
0.1155	0.212
0.1158	0.221
0.1160	0.233
0.1165	0.243
0.1166	0.248
0.1170	0.259
0.1176	0.257
0.1191	0.248

λ	ρ
DATA SET 2(CONT.)	
0.1193	0.241
0.1193	0.239
0.1193	0.222
0.1193	0.219
0.1202	0.215
0.1203	0.210
0.1205	0.188
0.1210	0.177
0.1212	0.173
0.1219	0.133
0.1226	0.133
0.1230	0.108
0.1242	0.091
0.1247	0.084
0.1251	0.083
0.1262	0.071
0.1270	0.067
0.1283	0.069
0.1294	0.064
0.1309	0.061
0.1320	0.056
0.1336	0.057
0.1340	0.054
0.1355	0.054
0.1365	0.053
0.1374	0.055
0.1376	0.051
DATA SET 3	
T = 77.0	
0.1051	0.036
0.1052	0.032
0.1056	0.032
0.1059	0.030
0.1062	0.025
0.1068	0.021
0.1069	0.017
0.1073	0.013
0.1076	0.010

λ	ρ
DATA SET 3(CONT.)	
0.1079	0.008
0.1081	0.005
0.1084	0.005
0.1086	0.003
0.1089	0.003
0.1092	0.003
0.1095	0.005
0.1100	0.011
0.1102	0.025
0.1106	0.036
0.1106	0.062
0.1109	0.085
0.1113	0.133
0.1116	0.165
0.1116	0.176
0.1117	0.192
0.1120	0.207
0.1119	0.215
0.1121	0.224
0.1123	0.227
0.1123	0.246
0.1123	0.253
0.1125	0.266
0.1128	0.266
0.1128	0.272
0.1131	0.292
0.1133	0.298
0.1133	0.310
0.1135	0.311
0.1137	0.314
0.1137	0.322
0.1137	0.327
0.1141	0.326
0.1139	0.328
0.1141	0.348
0.1143	0.352
0.1145	0.359
0.1148	0.365
0.1150	0.367
0.1150	0.378

λ	ρ
DATA SET 3(CONT.)	
0.1152	0.378
0.1152	0.382
0.1153	0.385
0.1156	0.391
0.1156	0.397
0.1156	0.399
0.1161	0.402
0.1165	0.399
0.1168	0.390
0.1166	0.392
0.1169	0.353
0.1172	0.334
0.1170	0.355
0.1173	0.354
0.1173	0.349
0.1176	0.312
0.1173	0.296
0.1179	0.289
0.1182	0.257
0.1179	0.247
0.1182	0.239
0.1184	0.224
0.1190	0.154
0.1191	0.167
0.1193	0.161
0.1199	0.133
0.1203	0.132
0.1206	0.122
0.1210	0.115
0.1212	0.105
0.1221	0.137
0.1225	0.105
0.1230	0.102
0.1232	0.093
0.1233	0.103
0.1237	0.097
0.1239	0.090
0.1238	0.093
0.1245	0.093
0.1251	0.090

λ	ρ
DATA SET 3(CONT.)	
0.1262	0.066
DATA SET 4	
T = 77.0	
20.38	0.032
20.96	0.034
21.97	0.193
23.96	0.445
24.94	0.509
26.00	0.437
DATA SET 5	
T = 293.0	
20.49	0.038
20.96	0.019
21.47	0.043
21.96	0.003
22.44	0.109
22.94	0.131
23.45	0.224
23.90	0.370
24.46	0.516
24.94	0.535
25.44	0.505
26.00	0.472
DATA SET 6	
T = 573.0	
21.48	0.029
21.98	0.054
22.48	0.095
22.95	0.150
23.45	0.221
23.90	0.350
24.43	0.439
24.95	0.489
25.44	0.464

TABLE 19. EXPERIMENTAL DATA ON THE REFLECTIVITY OF SODIUM FLUORIDE (continued)

λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ
DATA SET 6(CONT.)		DATA SET 7(CONT.)		DATA SET 8(CONT.)		DATA SET 8(CONT.)		DATA SET 9(CONT.)		DATA SET 10(CONT.)	
25.94	0.424	35.73	0.973	23.71	0.432	49.26	0.278	30.65	0.875	21.44	0.036
		36.36	0.961	23.97	0.495	50.42	0.266	31.39	0.900	21.74	0.045
DATA SET 7		37.36	0.935	24.18	0.537	52.21	0.246	32.21	0.919	22.03	0.061
T = 132.0		38.00	0.916	24.39	0.540	53.53	0.236	32.84	0.925	22.32	0.086
		38.59	0.876	24.70	0.527	54.79	0.230	33.44	0.938	22.68	0.113
19.50	0.020	39.43	0.699	25.11	0.497	56.40	0.222	34.11	0.939	23.02	0.150
20.00	0.021	40.29	0.571	25.54	0.463	58.24	0.218	35.06	0.947	23.29	0.208
20.72	0.027	41.22	0.479	25.79	0.456	60.53	0.221	35.73	0.948	23.51	0.251
21.07	0.037	41.47	0.457	26.19	0.469			36.36	0.940	23.71	0.306
21.44	0.044	41.87	0.436	26.69	0.526	DATA SET 9		37.36	0.945	23.97	0.373
21.74	0.052	42.75	0.295	27.11	0.597	T = 293.0		38.30	0.933	24.18	0.422
22.03	0.071	43.78	0.359	27.70	0.683			38.59	0.929	24.39	0.467
22.32	0.106	44.44	0.332	28.15	0.755	19.50	0.020	39.43	0.898	24.70	0.487
22.68	0.171	45.45	0.305	28.66	0.836	20.00	0.021	40.29	0.853	25.11	0.489
23.02	0.255	46.25	0.291	29.25	0.883	20.72	0.027	41.22	0.689	25.54	0.482
23.29	0.344	47.41	0.273	29.94	0.916	21.07	0.035	41.47	0.640	25.75	0.469
23.51	0.426	48.00	0.264	30.65	0.944	21.44	0.038	41.87	0.603	26.19	0.449
23.71	0.474	49.26	0.251	31.39	0.961	21.74	0.050	42.75	0.521	26.69	0.425
23.97	0.537	50.42	0.238	32.21	0.962	22.03	0.064	43.78	0.459	27.11	0.413
24.18	0.549	52.21	0.225	32.84	0.964	22.32	0.090	44.44	0.422	27.70	0.423
24.39	0.549	53.53	0.216	33.44	0.967	22.68	0.147	45.45	0.383	28.15	0.450
24.70	0.542	54.79	0.212	34.11	0.965	23.02	0.206	46.25	0.350	28.66	0.493
25.11	0.532	56.40	0.205	35.06	0.959	23.29	0.272	47.41	0.333	29.25	0.589
25.54	0.516	58.24	0.199	35.73	0.954	23.51	0.341	48.06	0.314	29.94	0.671
25.79	0.521			36.36	0.946	23.71	0.416	49.26	0.291	30.65	0.744
26.19	0.532	DATA SET 8		37.36	0.926	23.97	0.467	50.42	0.270	31.39	0.802
26.69	0.657	T = 215.0		38.00	0.910	24.18	0.498	52.21	0.254	32.21	0.831
27.11	0.722			38.59	0.876	24.39	0.526	53.53	0.245	32.84	0.858
27.70	0.804	19.50	0.020	39.43	0.765	24.70	0.527	54.79	0.235	33.44	0.856
28.15	0.848	20.00	0.021	40.29	0.677	25.11	0.512	56.40	0.226	34.11	0.864
28.66	0.891	20.72	0.027	41.22	0.582	25.54	0.487	58.24	0.222	35.00	0.874
29.25	0.913	21.07	0.036	41.47	0.567	25.79	0.469	60.53	0.221	35.73	0.879
29.94	0.935	21.44	0.042	41.87	0.526	26.19	0.449			36.36	0.893
30.65	0.953	21.74	0.051	42.75	0.476	26.69	0.436	DATA SET 10		37.36	0.878
31.39	0.961	22.03	0.067	43.78	0.427	27.11	0.465	T = 423.0		38.00	0.876
32.21	0.974	22.32	0.097	44.44	0.388	27.73	0.533			38.59	0.865
32.84	0.979	22.68	0.152	45.45	0.354	28.15	0.596	19.50	0.020	39.43	0.845
33.44	0.982	23.02	0.232	46.25	0.334	28.66	0.667	20.00	0.021	40.29	0.813
34.11	0.984	23.29	0.303	47.41	0.310	29.25	0.760	20.72	0.027	41.22	0.764
35.00	0.982	23.51	0.369	48.06	0.294	29.94	0.836	21.07	0.032	41.47	0.692

TABLE 18. EXPERIMENTAL DATA ON THE REFLECTIVITY OF SODIUM FLUORIDE (continued)

λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ
DATA SET 10(CONT.)		DATA SET 11(CONT.)		DATA SET 11(CONT.)		DATA SET 12(CONT.)		DATA SET 13(CONT.)		DATA SET 13(CONT.)	
41.87	0.643	25.79	0.457	60.53	0.245	35.06	0.663	23.29	0.092	47.41	0.440
42.75	0.563	26.19	0.449	61.72	0.245	35.73	0.676	23.51	0.106	48.00	0.417
43.78	0.494	26.69	0.429			36.36	0.688	23.71	0.126	49.26	0.396
44.44	0.438	27.11	0.430	DATA SET 12		37.36	0.702	23.97	0.145	50.42	0.377
45.45	0.398	27.70	0.416	T = 792.0		38.00	0.704	24.18	0.172	52.21	0.346
46.25	0.371	28.15	0.423			38.59	0.703	24.39	0.196	53.53	0.332
47.41	0.342	28.66	0.414	19.50	0.020	39.43	0.699	24.76	0.220	54.79	0.315
48.00	0.323	29.25	0.460	20.10	0.021	40.29	0.692	25.11	0.251	56.40	0.296
49.26	0.303	29.94	0.514	20.72	0.027	41.22	0.680	25.54	0.290	58.24	0.282
50.42	0.285	30.65	0.567	21.07	0.023	41.47	0.673	25.79	0.304	60.53	0.267
52.21	0.263	31.39	0.627	21.44	0.031	41.87	0.662	26.19	0.336		
53.53	0.254	32.21	0.680	21.74	0.042	42.75	0.645	26.69	0.365	DATA SET 14	
54.79	0.244	32.84	0.722	22.03	0.055	43.78	0.626	27.11	0.389	T = 298.0	
56.40	0.235	33.44	0.749	22.32	0.069	44.44	0.588	27.70	0.393		
58.24	0.227	34.11	0.773	22.68	0.091	45.45	0.547	28.15	0.397	20.0	0.023
60.53	0.221	35.06	0.798	23.02	0.113	46.25	0.510	28.66	0.395	8.30	0.023
61.72	0.214	35.73	0.809	23.29	0.135	47.41	0.474	29.25	0.393	21.0	0.064
		36.30	0.811	23.51	0.154	48.00	0.439	29.94	0.373	22.1	0.160
DATA SET 11		37.36	0.812	23.71	0.18	49.26	0.395	30.65	0.350	23.4	0.472
T = 635.0		38.00	0.807	23.97	0.20	50.42	0.358	31.39	0.369	24.5	0.551
		38.59	0.804	24.18	0.274	52.21	0.327	32.21	0.393	26.3	0.430
19.50	0.020	39.43	0.788	24.39	0.299	53.53	0.306	32.84	0.419	27.4	0.456
20.10	0.021	40.29	0.772	24.73	0.343	54.79	0.294	33.44	0.434	30.0	1.016
20.72	0.027	41.22	0.741	25.11	0.353	56.40	0.278	34.21	0.455	34.0	0.916
21.07	0.032	41.47	0.730	25.54	0.394	56.24	0.266	35.00	0.495	37.5	0.922
21.44	0.035	41.87	0.717	25.79	0.410	60.53	0.255	35.73	0.502	40.1	0.942
21.74	0.043	42.75	0.675	26.19	0.423			36.36	0.520	41.3	0.767
22.03	0.050	43.78	0.600	26.69	0.419	DATA SET 13		37.36	0.547	41.9	0.572
22.32	0.093	44.44	0.527	27.11	0.430	T = 958.6		38.00	0.559	43.3	0.437
22.65	0.113	45.45	0.467	27.70	0.424			38.59	0.565	45.0	0.376
23.02	0.150	46.25	0.432	28.15	0.415	19.56	0.020	39.43	0.570	48.0	0.286
23.29	0.178	47.41	0.398	28.66	0.409	20.10	0.021	40.29	0.571	50.0	0.249
23.51	0.213	48.00	0.378	29.25	0.430	20.72	0.027	41.22	0.595		
23.71	0.255	49.26	0.348	29.94	0.402	21.07	0.022	41.47	0.587	DATA SET 15	
23.97	0.309	50.42	0.324	30.65	0.419	21.44	0.027	41.87	0.564	T = 300.0	
24.18	0.350	52.21	0.301	31.39	0.468	21.74	0.028	42.75	0.552		
24.39	0.379	53.53	0.286	32.21	0.525	22.03	0.032	43.78	0.533	19.9	0.047
24.70	0.409	54.79	0.278	32.84	0.563	22.32	0.042	44.44	0.518	21.4	0.088
25.11	0.433	56.40	0.266	33.44	0.599	22.68	0.058	45.45	0.485	22.1	0.158
25.54	0.453	58.24	0.258	34.11	0.625	23.02	0.075	46.25	0.462	23.3	0.417

TABLE 18. EXPERIMENTAL DATA ON THE REFLECTIVITY OF SODIUM FLUORIDE (continued)

λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ
DATA SET 15(CONT.)		DATA SET 16(CONT.)		DATA SET 17(CONT.)		DATA SET 18(CONT.)		DATA SET 18(CONT.)		DATA SET 19(CONT.)	
23.8	0.54[illegible]	0.0599	0.0485	0.1123	0.189	0.1047	0.034	0.1253	0.090	24.5098	0.421
24.2	0.503	0.0604	0.0433	0.1122	0.222	0.1052	0.034	0.1267	0.093	24.7524	0.421
24.6	0.557	0.0613	0.0503	0.1124	0.232	0.1059	0.034	0.1277	0.079	25.[illegible]	0.405
25.3	0.433	0.0635	0.0366	0.1128	0.262	0.1066	0.032	0.1294	0.072	25.4492	0.380
26.1	0.472	0.0653	0.0159	0.1134	0.315	0.1070	0.032	0.1302	0.064	25.7500	0.347
26.7	0.5[illegible]	0.0677	0.0129	0.1145	0.380	0.1078	0.029	0.1313	0.062	26.4553	0.351
29.0	0.344	0.0688	0.0130	0.1147	0.391	0.1082	0.025	0.1326	0.063	26.9541	0.306
30.1	0.399	0.0716	0.0346	0.1149	0.403	0.1085	0.023	0.1336	0.057	28.7356	0.574
31.8	0.332	0.0733	0.0472	0.1152	0.443	0.1089	0.016	0.1346	0.056	29.3255	0.627
34.1	0.343	0.0751	0.0509	0.1161	0.482	0.1095	0.011	0.1359	0.055	30.[illegible]	0.681
36.5	0.334	0.0765	0.0491	0.1162	0.462	0.1102	0.006	0.1371	0.053	30.9597	0.733
38.3	0.332	0.0776	0.0462	0.1164	0.458	0.1104	0.006	0.1380	0.053	32.2580	0.772
41.4	0.57[illegible]	0.0779	0.0475	0.1166	0.453	0.1107	0.007	0.1385	0.053	33.8983	0.800
42.1	0.437	0.0794	0.0476	0.1169	0.452	0.1110	0.010	0.1394	0.051	35.9712	0.814
43.4	0.424	0.0810	0.0472	0.1173	0.418	0.1116	0.022	0.1396	0.047	37.0370	0.798
45.0	0.358	0.0892	0.0316	0.1176	0.344	0.1119	0.038	0.1831	0.030	38.3141	0.768
47.3	0.329	0.0925	0.0272	0.1179	0.[illegible]50	0.1121	0.051	0.1859	0.030	39.2156	0.744
51.6	0.279	0.0976	0.0242	0.1187	0.218	0.1124	0.071	0.1881	0.029	40.0000	0.702
		0.10[illegible]8	0.0234	0.1191	0.200	0.1133	0.142	0.1901	0.030	40.6504	0.633
DATA SET 16		0.1033	0.0243	0.1198	0.165	0.1147	0.223	0.1920	0.031	41.3223	0.571
T = 3[illegible]		0.1050	0.0245	0.1205	0.144	0.1152	0.250	0.1931	0.031	42.1940	0.501
		0.1109	0.0225	0.1215	0.122	0.1161	0.280	0.1952	0.029	43.1034	0.457
0.0413	0.0334	0.1107	0.0222	0.1230	0.100	0.1166	0.294	0.1971	0.027	43.5590	0.421
0.0423	0.0334	0.1158	0.0458	0.1240	0.092	0.1172	0.310	0.1993	0.027	45.[illegible]54	0.39[illegible]
0.0436	0.0343	0.1203	0.[illegible]124	0.1252	0.086	0.1175	0.313	0.2016	0.026	46.7289	0.364
0.0446	0.0352	0.1240	0.0924	0.1261	0.081	0.1181	0.315	0.2029	0.026	50.0000	0.334
0.0457	0.03[illegible]3	0.1231	0.0598	0.1277	0.081	0.1183	0.311	0.2046	0.026	52.3560	0.314
0.0469	0.0350	0.1333	0.0471	0.1278	0.074	0.1188	0.311	0.2066	0.026	54.3478	0.293
0.0475	0.0358	0.1443	0.0423			0.1191	0.304			56.1797	0.265
0.0493	0.0357	0.1653	0.0329	DATA SET 18		0.1193	0.298	DATA SET 19		59.1716	0.241
0.0502	0.0[illegible]92	0.1771	0.0297	T = 235.0		0.1199	0.280	T = 293.0		63.2911	0.234
0.0506	0.0[illegible]5	0.2000	0.0288			0.1201	0.273			68.9655	0.228
0.0527	0.0263			0.0932	0.031	0.1205	0.247	21.5053	0.017	74.0265	0.222
0.0532	0.0249	DATA SET 17		0.1003	0.034	0.1210	0.205	21.6919	0.010		
0.0539	0.02[illegible]5	T = 70.0		0.1007	0.034	0.1215	0.188	21.9786	0.017	DATA SET 20	
0.0549	0.0177			0.1017	0.035	0.1219	0.175	22.3214	0.041	T = 273.0	
0.0561	0.0131	0.11[illegible]2	0.020	0.1026	0.033	0.1224	0.159	22.7272	0.081		
0.0568	0.0133	0.1125	0.023	0.1031	0.033	0.1232	0.136	23.3414	0.124	0.1150	0.281
0.0575	0.0121	0.1128	0.058	0.1035	0.033	0.1240	0.115	23.9234	0.330	0.1166	0.294
0.0587	0.0198	0.1127	0.158	0.1041	0.035	0.1246	0.105	24.3369	0.460	0.1169	0.308

TABLE 18. EXPERIMENTAL DATA ON THE REFLECTIVITY OF SODIUM FLUORIDE (continued)

DATA SET 20(CONT.)

	ρ
0.1170	0.310
0.1176	0.313
0.1133	0.307
0.1137	0.305
0.1137	0.303
0.1190	0.300
0.1193	0.297
0.1199	0.280
0.1201	0.272
0.1205	0.257
0.1206	0.247
0.1210	0.204
0.1215	0.196
0.1219	0.175
0.1224	0.157
0.1232	0.134
0.1233	0.116
0.1245	0.105
0.1253	0.090
0.1273	0.094
0.1277	0.079
0.1291	0.072
0.1302	0.065
0.1311	0.063
0.1314	0.058
0.1330	0.056
0.1343	0.055
0.1356	0.053
0.1371	0.052
0.1387	0.049
0.1394	0.045
0.1402	0.045
0.1415	0.045
0.1428	0.044
0.1455	0.041
0.1467	0.040
0.1490	0.039
0.1503	0.038
0.1527	0.036
0.1542	0.034

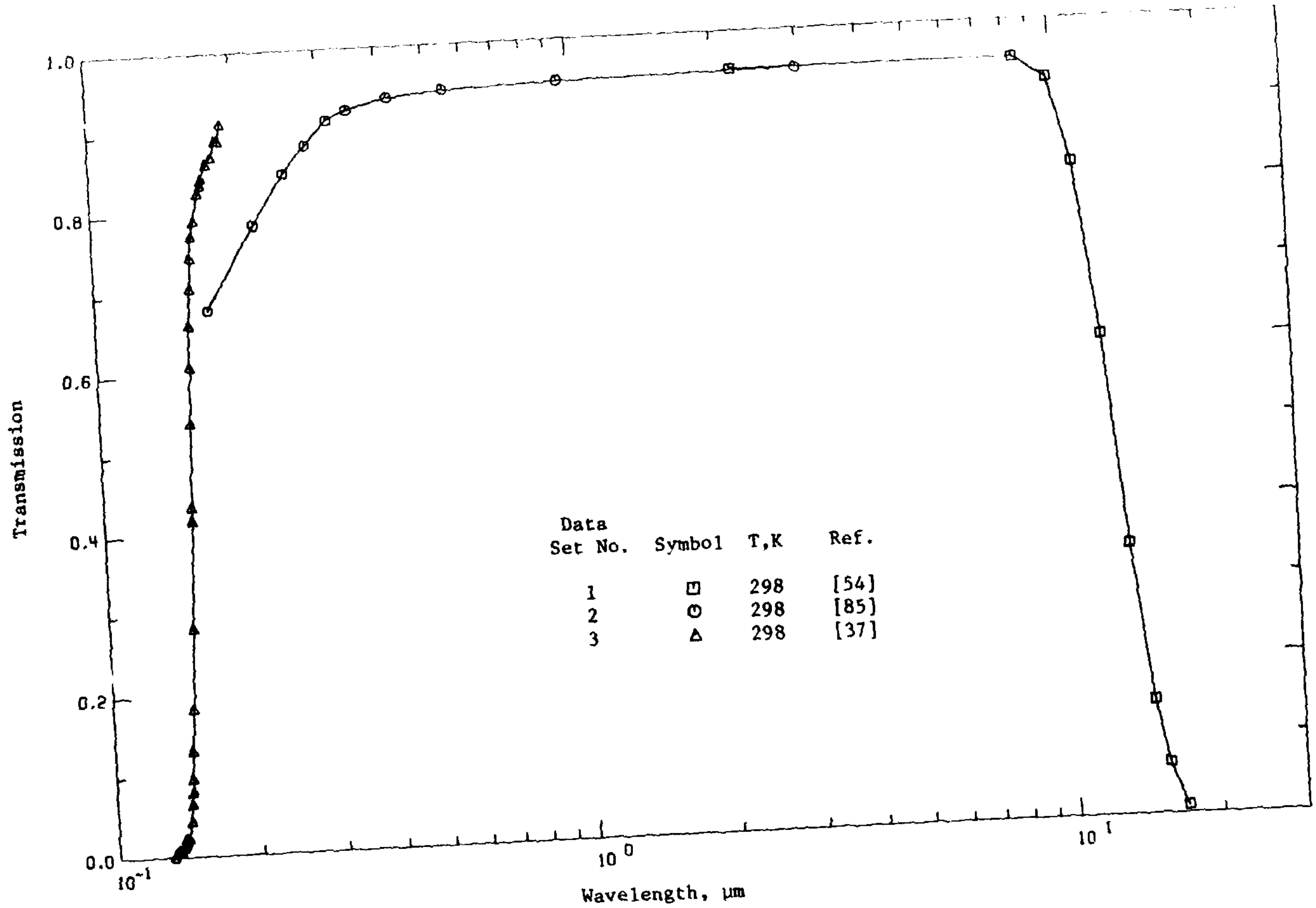

Figure 14. Transmission of Sodium Fluoride

TABLE 19. SUMMARY OF MEASUREMENTS ON THE TRANSMISSION OF SODIUM FLUORIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	54	McCarthy, D.E.	1965	T	2.20-16.8	298	Synthetic crystal; 2.16 mm thick; polished to flatness of 10 fringes of sodium D line; data extracted from a curve.
2	85	McCarthy, D.E.	1967	T	0.171-3.00	298	Single synthetic crystal; obtained from Harshaw Chemical Co.; thickness of 2.16 mm; the two surfaces of the specimen were parallel to within 0.001 mm/mm length; polished to flatness of 10 fringes of the mercury green line; data extracted from a curve.
3	37	Tomiki, T. and Miyata, T.	1969	T	0.13-0.19	298	Single crystal; obtained from Harshaw Chemical Co.; freshly cleaved specimen of 0.188 cm; transmittance measured in vacuum; data extracted from a curve.

TABLE 1[illegible]. EXPERIMENTAL DATA ON THE TRANSMISSION OF SODIUM [illegible]

[Wavelength, λ, μm; temperature, T, K; transmission, τ]

λ	τ
DATA SET 1	
T = 298.0	
2.20	0.352
8.40	0.352
9.50	[illegible]
10.9	[illegible]
12.1	[illegible]
[illegible]	[illegible]
14.6	0.143
[illegible]	[illegible]
16.8	[illegible]
DATA SET 2	
T = 298.0	
0.171	[illegible]
0.217	0.735
0.252	0.847
0.281	0.891
0.314	0.911
0.347	0.923
0.421	0.936
0.550	0.943
[illegible]	0.947
[illegible]	0.951
DATA SET 3	
T = 298.0	
0.130	[illegible]
0.131	[illegible]
0.133	0.009
0.134	[illegible]
0.134	[illegible]
0.135	0.013
0.137	0.016
0.138	0.019
0.138	0.023
0.139	0.023
0.140	0.023
0.142	0.045
DATA SET 3(CONT.)	
0.143	0.068
0.144	0.081
0.144	0.098
0.145	0.133
0.147	0.185
0.149	0.285
0.150	[illegible]
0.152	0.437
0.154	[illegible]
0.155	[illegible]
0.156	0.653
0.158	0.709
0.159	0.747
0.160	0.774
0.163	0.793
0.167	0.827
0.170	0.837
0.170	0.845
0.175	0.863
0.180	0.872
0.183	0.892
0.186	0.892
0.189	0.913

TABLE 21. PEAK POSITIONS (λ_{max}) IN μm AND HALF-WIDTHS (W) IN eV FOR THE F, R, M, AND N ABSORPTION BANDS IN SODIUM FLUORIDE*

Interionic dist., d (Å)	Temp.	F band		R_1 band	R_2 band	M band		N bands
		λ_{max}	W	λ_{max}	λ_{max}	λ_{max}	W	λ_{max}
2.31	RT	(0.328)†		(0.381)	(0.412)	(0.516)		
		0.335	0.70		0.415	0.505	0.16	
		0.340	0.51			0.507		
		0.341				0.510		
		0.342						
	NT	0.332	0.50			0.498		
	HT	0.336						

* Values were taken from Ref. [69].

† Values given in parentheses are calculated from the Ivey relations [70].

F band $\lambda_{max} = 703\ d^{1.84}$ for NaCl structure, $\lambda_{max} = 251\ d^{2.5}$ for CsCl structure.

R_1 band $\lambda_{max} = 816\ d^{1.84}$

R_2 band $\lambda_{max} = 884\ d^{1.84}$

M band $\lambda_{max} = 1400\ d^{1.56}$

TABLE 22. RECOMMENDED VALUES ON ABSORPTION COEFFICIENT OF SODIUM FLUORIDE IN IR REGION AT 300 K

ν, cm^{-1}	λ, μm	Absorption Coefficient, cm^{-1}	
		Intrinsic*	Observed† (Selected)
6.000E+02	16.7	3.2E+1	
7.000E+02	14.3	9.1E+0	7.4E+0
8.000E+02	12.5	2.6E+0	2.7E+0
9.000E+02	11.1	7.3E-1	8.0E-1
9.434E+02	10.6	4.2E-1	5.5E-1
1.000E+03	10.0	2.1E-1	
1.075E+03	9.30	8.1E-2	2.7E-1
1.100E+03	9.09	5.9E-2	4.6E-2
1.200E+03	8.33	1.6E-2	
1.300E+03	7.69	4.8E-3	4.8E-3
1.400E+03	7.14	1.3E-3	1.4E-3
1.500E+03	6.67	3.9E-4	
1.600E+03	6.25	1.1E-4	
1.700E+03	5.88	3.1E-5	
1.800E+03	5.56	8.9E-6	
1.887E+03	5.30	3.0E-6	
1.900E+03	5.26	2.5E-6	
2.000E+03	5.00	7.2E-7	
2.100E+03	4.76	2.0E-7	
2.200E+03	4.55	5.8E-8	
2.300E+03	4.35	1.6E-8	
2.400E+03	4.17	4.7E-9	
2.500E+03	4.00	1.3E-9	
2.600E+03	3.85	3.8E-10	
2.632E+03	3.80	2.5E-10	

*Intrinsic values were calculated according to Eq. (26) with uncertainties about ±10%.

†Values in this column are the total absorption coefficient which are either lowest reported or those used to define the constants in Eq. (26). Uncertainties of these values are about ±10%.

3.3. Sodium Chloride, NaCl

Pure rock salt is uniformly transparent from 0.2 μm in the ultraviolet to 12 μm in the infrared. In the region of 15 μm the absorption increases rapidly. Rock salt, in moderately thin pieces, may be expected to transmit several percent of the light up to wavelengths as long as 26.0 μm. However, a plate 1 cm in thickness is completely opaque to radiation of wavelengths greater than 20 μm.

Rock salt has long been a favorite material for infrared spectroscopy. It polishes easily and, although hygroscopic, it can be protected by evaporated plastic coatings on its surfaces. It shows excellent dispersion over its entire transmission range. It has been difficult, however, to obtain natural rock salt crystals of sufficient size and purity for making optical components. As crystal-growing techniques advanced, synthetic sodium chloride crystals have been grown commercially up to 30 inch diameter and half-ton in weight, making this material readily available for large optical parts and thus stimulating the design and construction of infrared instruments.

Measurement of the refractive index of sodium chloride dates back to 1871, when Stefan [86] determined the refractive indices of a rock salt prism for solar lines B, D, and F. Since then, a large amount of data in the transparent region has been contributed by a number of investigators, among them are Martens [87], Paschen [88], and Langley [89]. They used either the deviation method or interferometry in their experiments. It was not until 1929 that measurements were carried out beyond the transparent region in the infrared. Kellner [90] determined refractive indices of NaCl in the 23-35 μm region, based on information on transmission and reflection of thin specimens. In the vacuum ultraviolet region, Rossler and Walker [91] observed the region from 0.0476 to 0.2480 μm, and Miyata and Tomiki [92] studied from 0.10 to 0.25 μm. Data on the refractive index are now available from 0.0476 μm up to 300 μm and at 2000 μm. It was found that refractive index data in the transparent regions for colorless natural rock salt are in close agreement with those for synthetic sodium chloride crystal with discrepancies occurring in the third decimal place.

Li [33] reduced the then available experimental data on the refractive index to a common temperature of 293 K and after careful critical evaluation and analysis adopted a Sellmeier type dispersion equation to evaluate the refractive index at 293 K in the wavelength range 0.20-30.0 μm:

$$n^2 = 1.00055 + \frac{0.19800\ \lambda^2}{\lambda^2-(0.050)^2} + \frac{0.48398\ \lambda^2}{\lambda^2-(0.100)^2} + \frac{0.38696\ \lambda^2}{\lambda^2-(0.128)^2} + \frac{0.25998\ \lambda^2}{\lambda^2-(0.158)^2}$$

$$+ \frac{0.08796\ \lambda^2}{\lambda^2-(40.50)^2} + \frac{3.17064\ \lambda^2}{\lambda^2-(60.98)^2} + \frac{0.30038\ \lambda^2}{\lambda^2-(120.34)^2} \qquad (27)$$

where λ is in units of μm.

Investigations of absorption coefficient for practical applications are generally classified into three wavelength regions: the ultraviolet and the infrared limits of the transparent region and the transparent regions. In the ultraviolet side, the purposes of the studies were to investigate the exciton states in the crystal and to determine the Urbach-rule parameters. Roessler and Walker [91] determined the absorption index of NaCl in the spectral range from 0.047 to 0.248 μm by a Kramers-Kronig analysis of reflection spectrum. Evidenced by the strong temperature dependence of reflectivity in the exciton region and the appearance of spin-orbit split doublets, the surfaces of the specimen examined were believed to be near perfect. Kobayashi and Tomiki [93] studied the effects of impurities on the absorption coefficient and found significant differences between crystals in the spectral range from 0.171 to 0.231 μm. The main soruces of such discrepancies were the presence of hydroxyl ions and dislocations in the crystals. Miyata and Tomiki [94] and Tomiki et al. [77] studied the absorption of NaCl in the region 0.156 to 0.205 μm for the purpose of determining the Urbach-rule parameters and finding the features characteristic of the intrinsic tail. Through a systematic observation and analysis they found the following empirical relations among certain parameters:

$E_o = 8.025$ eV
$\alpha_o = 1.2 \times 10^{10}$ cm^{-1}
$hf = 9.5$ meV
$\sigma_{so} = 0.741$

for the expression of absorption coefficient of the intrinsic tail

$$\alpha(E,T) = \alpha_o \exp\ [-\sigma_s(T)\ (E_o-E)/kT]$$

where

$$\sigma_s(T) = \sigma_{so} \frac{2kT}{hf} \tanh \frac{hf}{2kT} \qquad (28)$$

Measurements of absorption coefficient at the infrared side were made for the purpose of studying the optically active lattice vibrations. On the short wavelength side of the reststrahl band, where a photon is absorbed and two or more phonons are generated, multiphonon absorption can occur and lead to absorption coefficients that range from 10^{-3} cm^{-1} to 100 cm^{-1}, depending on the number of phonons generated.

Measurements of the absorption coefficient in the transparent region are relatively recent events as the development of high-power IR lasers has led to a need for better characterization of IR window materials. Among other things, the absorption coefficient plays a decisive role in determining whether a material is adequate for laser optical components. For this reason, absorption coefficients of a number of selected materials were investigated at wavelengths of laser interest. Sodium chloride is among the candidate laser window materials and its absorption coefficients at wavelengths 1.06, 2.7, 3.8, 5.3, and 10.6 μm were intensively studied in order to determine the influencing factors that contribute to the extrinsic absorption. These studies are very informative and provide clues and means for material preparation and parts fabrication in order to minimize the extrinsic components in the absorption. Califano and Czerny [95] examined the region, 11-14 μm, at room temperature. Barker [38] measured the region, 11-20 μm, at temperatures from 300 K up to 1105 K, 31 degrees beyond the melting temperature of NaCl. Harrigan and Rudko [96] obtained the 10.6 μm absorption coefficient, 1.3×10^{-3} cm^{-1}, for NaCl by a CO_2 laser calorimetric method. This value was believed intrinsic, as evidenced by the fact that no noticeable improvement could be obtained by improvements in purity and growth techniques.

Deutsch [12], using a differential technique with a dual beam spectrometer measured the absorption coefficient for the wavelength range from 11.7 to 20 μm, at room temperature. Together with data from earlier investigations, it was found that the absorption coefficient in the multiphonon absorption region can be represented by the expression

$$\alpha = \alpha_o \exp(-\nu/\nu_o) \qquad (29)$$

where $\nu_o = 56.0$ cm^{-1}, and $\alpha_o = 2.4273 \times 10^4$ cm^{-1}. This relation covers the ranges of $\alpha = 0.001$ to 44 cm^{-1} and $\lambda = 10.6$ to 28.1 μm. It is not known if the exponential relations hold for the lower wavelength regions. If they do, the extrapolated values at 5.3 μm should be 6×10^{-10}.

Harrington and Hass [78] studied the temperature dependence of multiphonon absorption at a wavelength of 10.6 μm, from room temperature to near the melting point, by the calorimetric method. It was observed that the absorption coefficient increases monotonically with temperature as it would be anticipated for the near-intrinsic absorption of the crystal. Based on their high temperature (above 450 K) results, the extrapolated value at 300 K is in close agreement with that of Horrigan and Rudko [96]. However, their experimental values in the range below 450 K are considerably higher than the extrapolated values. Their value at 300 K is 2.8×10^{-3} cm^{-1}, apparently higher than 1.3×10^{-3} cm^{-1} reported by Horrigan and Rudko. This situation is quite similar to the case of KCl whose 10.6 μm absorption is complicated by the existence of a surface absorption band at 9.5 μm. The only difference between NaCl and KCl is that the intrinsic absorption of NaCl is about 2 to 3 orders of magnitude higher than that of KCl while the value of surface absorption observed in the case of KCl is about one order of magnitude higher. As a result, contribution form surface absorption dominates the 10.6 μm absorption of KCl, whereas the reverse is true in the case of NaCl for a surface absorption of similar magnitude and spectral location.

Hass et al. [97] used an improved laser calorimetric technique in the determination of the 1.06 μm absorption coefficient for NaCl. The observation of the temperature-time curve (thermal rise curve) indicated that the slope of the curve during the lasing duration is constant and corresponds to an absorption coefficient of 7×10^{-6} cm^{-1}, which is the lowest value of absorption coefficient reported so far for a crystalline material. In this technique, if the slope varies with time, the initial slope of the curve corresponds to the bulk absorption. With elapsed time, surface absorptions and other contributions are revealed as evidenced by an increase in the slope.

Allen and Harrington [98] measured the total absorption coefficients at infrared laser wavelengths of 2.8, 3.8, 5.3, 9.27, and 10.6 μm, using the calorimetric method. The samples, cut from a given boule, were reactive-atmosphere-processed single crystals. It was found that samples of higher purity exhibit lower absorption. Although all samples indicated essentially intrinsic absorption at 10.6 μm, absorption at other wavelengths were considerably higher than the intrinsics. Such excess absorption are mainly due to surface absorption and chemical impurities, which play an important role at low intrinsic levels.

At 3.8 μm, Rosenstock et al. [99] studied samples procured from a wide variety of sources and found that the bulk absorption coefficient was 9×10^{-4} cm^{-1} and the surface absorption 4×10^{-2} cm^{-1}. Rowe and Harrington [100] studied the temperature dependence of absorption coefficient at 10.6 μm, in the temperature range from 100 to 300 K. Combined with the results of Harrington and Hass [78], they found that the multiphonon theory of McGill and Winston [111] adequately fit the experimental data.

Figures 15 to 18 are plots of the available data. The pertinent information of each data set and the corresponding original values are given in Tables 23 to 26. In addition, available information and data on the reflectivity and transmission are also presented in the same manner (in Figures 19 and 20 and Tables 27 to 30) for completeness and comparison. For the visible and near visible regions, Table 31 gives the spectral positions of the well-known color centers. Noticeable absorptions are likely to occur at these centers when the crystal is exposed to ultraviolet, x-ray, or high energy radiation. However, these absorption bands may disappear at high temperature or by appropriate radiation exposure, resulting from the so-called "thermal and optical beaching."

Recommended room-temperature values given in Table 32 were calculated according to Eq. (29). In the range between 11 to 23 μm, these values are supported by measurements of Califano et al. [95] and Barker [38]. It appears that NaCl has high intrinsic absorption in this region. If Eq. (29) holds in the region <5 μm, the intrinsic absorptions in this region are lower than 10^{-4} cm. However, like most of optical crystals, one expects to observe an absorption band in the range between 2.6 to 2.8 μm due to the hydroxyl ions in the crystal. This absorption band can be reduced or eliminated through improved crystal growing techniques. It should be noted that the values in the "intrinsic" column are the lowest limits that one can obtain for ideal samples. In practice, the observed values are generally higher than the limiting values at low absorption levels. Unless values appear in the "observed" column, the limiting values are considered as guidelines for estimation and investigation.

Although it was not the intention of this study to compile and evaluate the absorption data in the vacuum ultraviolet region, in order to assist users to obtain a total picture of the available absorption data, a plot of available data in this region is given in the Appendix of this report.

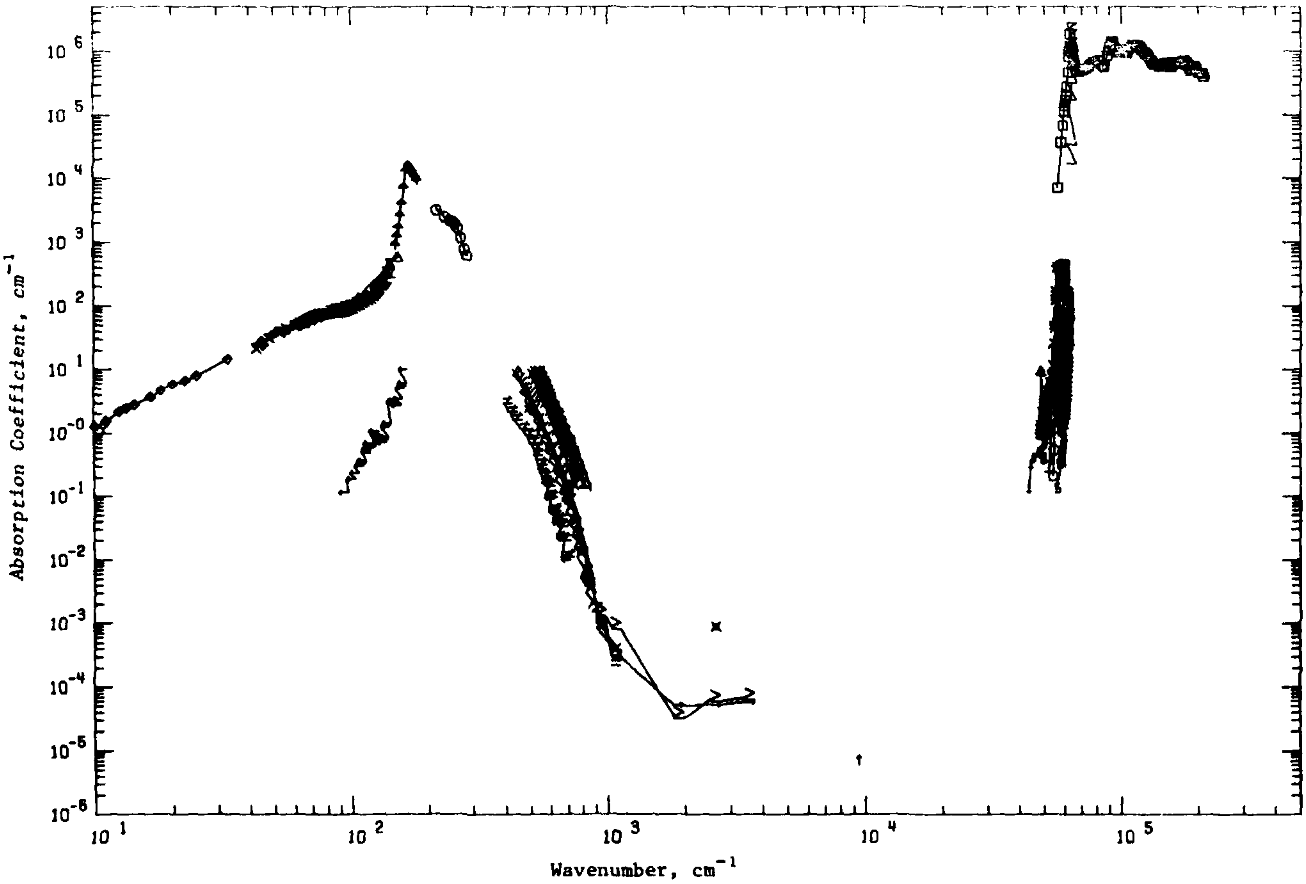

Figure 15. Absorption Coefficient of Sodium Chloride (Wavenumber Dependence)

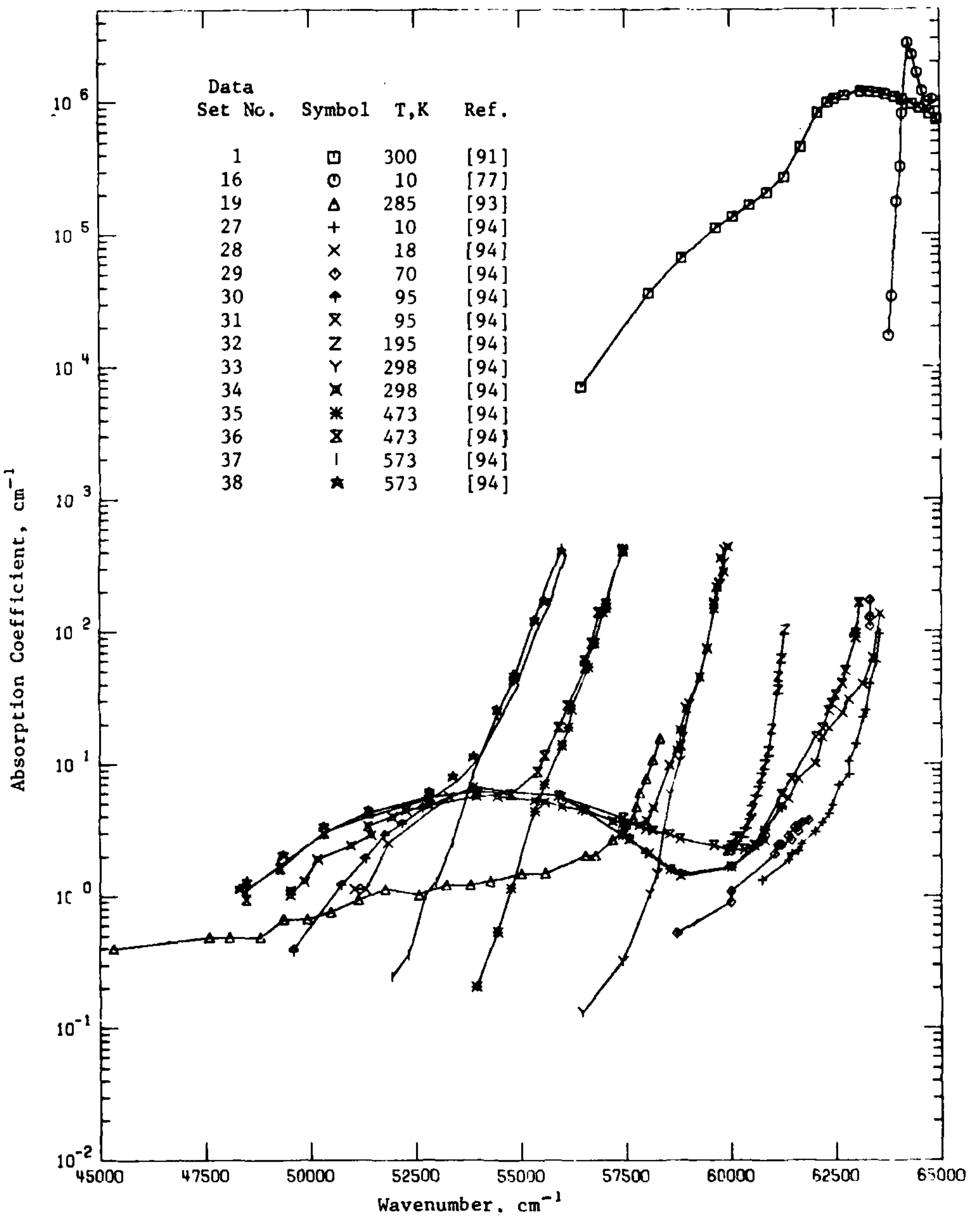

Figure 16. Absorption Coefficient of Sodium Chloride in the Urbach Tail Region

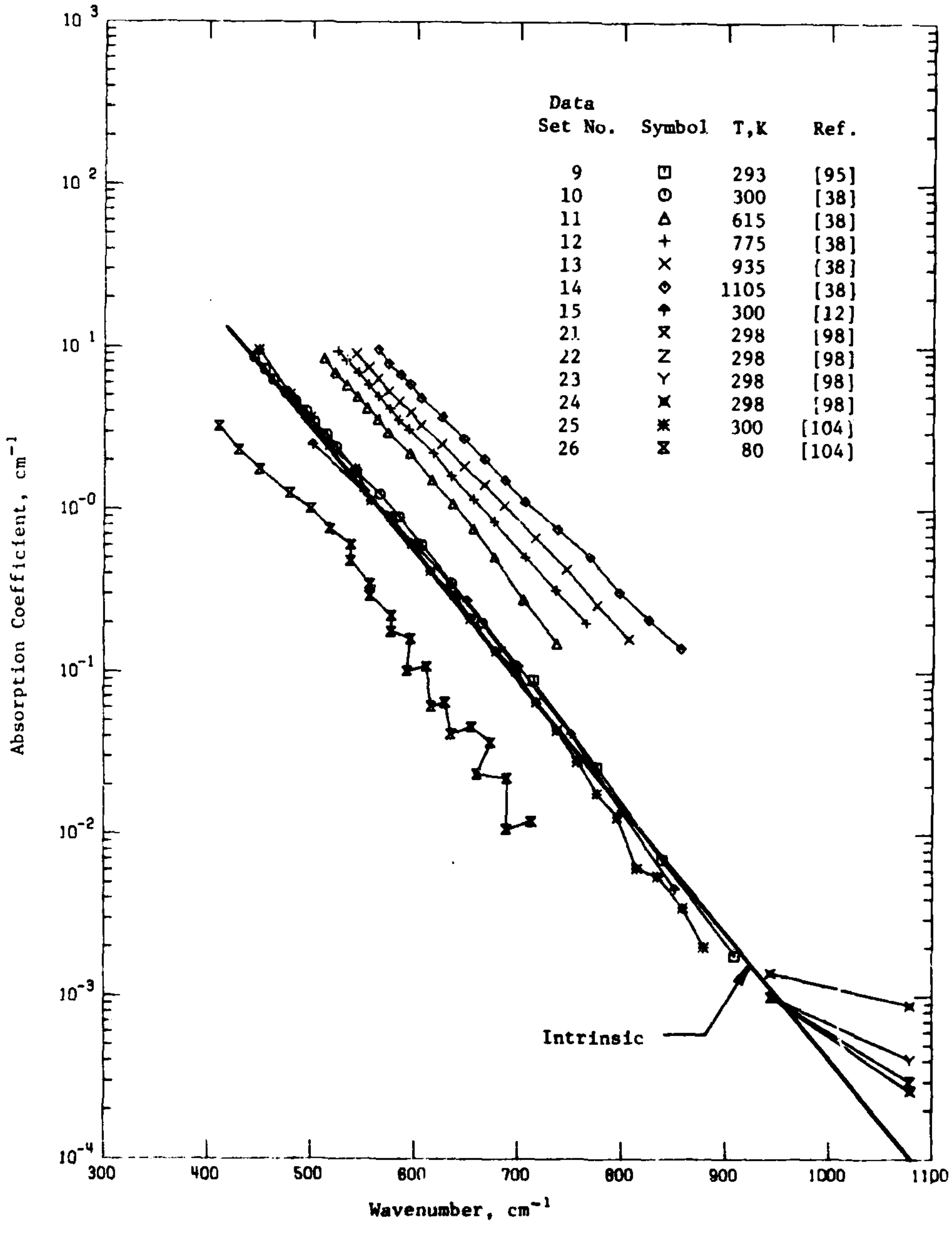

Figure 17. Absorption Coefficient of Sodium Chloride in the Multiphonon Region

TABLE 23. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF SODIUM CHLORIDE (Wavenumber Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	91	Roessler, D.M. and Walker, W.C.	1968	R	$5.64x10^4$–$2.1x10^5$	300	Single crystal; obtained from the Harshaw Chemical Co. or the Westinghouse Electric Corp.; absorption coefficients derived from a Kramers-Kronig analysis of the near normal reflection spectra; data extracted from a table.
2	101	Czerny, M.	1930	T	$2.1x10^2$–$2.9x10^2$	293	Crystal; plate specimens of thicknesses 8, 14, 19, 24 mm; transmittances measured; absorption coefficients deduce from the exponential decay relation; data extracted from a table; temperature not given, 293 K assumed.
3	101	Czerny, M.	1930	T	$6.5x10^1$–$1.54x10^2$	293	Similar to above except for specimens of various thicknesses from 20 to 385 mm.
4	102	Cartwright, C.H. and Czerny, M.	1934	Z	$9.3x10^1$–$1.36x10^2$	293	Crystal; thin plate specimen of 60 mm; absorption coefficients deduced from transmittance and thickness measurements; data extracted from a figure.
5	102	Cartwright, C.H. and Czerny, M.	1934	Z	55.7,69.3	293	Similar to above except for specimen of 97 mm thick.
6	102	Cartwright, C.H. Czerny, M.	1934	Z	$4.53x10^1$–$1.37x10^2$	293	Similar to above except for specimen of 147 mm thick.
7	102	Cartwright, C.H. and Czerny, M.	1934	Z	44.7–78.0	293	Similar to above except for specimen of 237 mm thick.
8	102	Cartwright, C.H. and Czerny, M.	1934	Z	42.8–52.5	293	Similar to above except for specimen of 380 mm thick.
9	95	Califano, S. and Czerny, M.	1958	T	$7.14x10^2$–$9.1x10^2$	293	Crystal; block specimens of 10.52 and 16.77 cm; extinction coefficients determined from transmittance measurements; data extracted from a figure.
10	38	Barker, A.J.	1972	R	$4.4x10^2$–$7.0x10^2$	300	Synthetic crystal; high purity; highly polished specimen of 1-2 mm thick; absorption coefficients deduced from measurements of reflectivity; absorption-coefficient data extracted from a figure.
11	38	Barker, A.J.	1972	R	$5.1x10^2$–$7.4x10^2$	615	Similar to above except at a higher temperature.
12	38	Barker, A.J.	1972	R	$5.2x10^2$–$7.7x10^2$	775	Similar to above except at a higher temperature.
13	38	Barker, A.J.	1972	R	$5.4x10^2$–$8.1x10^2$	935	Similar to above except at a higher temperature.
14	38	Barker, A.J.	1972	R	$5.6x10^2$–$8.6x10^2$	1105	Molten NaCl specimen of 1-2 mm thick; reflectivity measurements carried out in a largely inert gas atmosphere; absorption coefficients deduced from reflection spectra; absorption-coefficient data extracted from a figure; melting temperature of NaCl is 1074 K.

TABLE 23. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF SODIUM CHLORIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
15	12	Deutsch, T.F.	1973	T	$5.0\times10^{2}-8.5\times10^{2}$	300	Single crystal; obtained from Optovac Co.; specimen of 2.54 cm diameter and 2.54 cm thick; absorption coefficient determined using a differential technique with a dual-beam spectrophotometer; data extracted from a figure.
16	77	Tomiki, T., Miyata, T., and Tsukamoto, H.	1974	R	$6.37\times10^{4}-6.50\times10^{4}$	10	Single crystal; obtained from the Harshaw Chemical Co.; absorption coefficients deduced from reflection spectra; data extracted from a figure.
17	103	Ikezawa, M. and	1973	R	$9.3\times10^{1}-1.6\times10^{2}$	1.8	Single crystal; grown from pure synthesized powders distilled in vacuum and zoned refined in a quartz tube in chlorine gas; cleaved; geometry not specified; data taken from a curve.
18	42	Owens, J.	1969	T	0.31-4.0	298	Single crystal; obtained from the Harshaw Chemical Co.; cylinder shaped specimen; filled resonant cavity method used for measuring dielectric constant and loss tangent; absorption coefficient then determined; data extracted from a figure.
19	93	Kobayashi, K. and Tomiki, T.	1960	R	$4.3\times10^{4}-5.83\times10^{4}$	285	Single crystal; grown by vacuum distillation; cleaved specimens of 0.06-1.0 mm thick; absorption coefficients measured with a vacuum ultraviolet spectrophotometer; data extracted from a figure.
20	97	Hass, M., Davison, J.W., Rosenstock, H.B. and Babiskin, J.	1975	C	9434	298	Single crystal; obtained from the Harshaw Chemical Co.; rectangular parallelepiped specimen of 1.2 cm x 1.3 cm x 10.3 cm; laser calorimetric method used and the thermal rise curve obtained; bulk absorption coefficient determined from the initial slope of the curve.
21	98	Allen, S.D. and Harrington, J.A.	1978	C	943.4,1079	298	Single crystal; produced by reactive-atmosphere-process; samples sectioned from a given boule; calorimetric method used and total absorption determined; data extracted from a table.
22	98	Allen, S.D. and Harrington, J.A.	1978	C	943.4-3571	298	Same as above but for a sample from other section of the boule.
23	98	Allen, S.D. and Harrington, J.A.	1978	C	943.4,1079	298	Same as above.
24	98	Allen, S.D. and Harrington, J.A.	1978	C	943.4-3571	298	Same as above.
25	104	Harrington, J.A., Duthler, C.J., Patten, F.W. and Hass, M.	1976	C	449-879	300	Single crystal; obtained from the Harshaw Chemical Co.; experimental details not given; data extracted from a figure.
26	104	Harrington, J.A. et al.	1976	C	411-713	80	Same as above.

TABLE 23. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF SODIUM CHLORIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
27	94	Miyata, T. and Tomiki, T.	1967	Z	6.07×10^4-6.36×10^4	10	Single crystal; obtained from the Harshaw Chemical Co. and also prepared by a chemical reaction and purified by vacuum distillation and followed by zone melting in chlorine atmosphere; specimens cleaved from ingots zone refined many cycles; dimension of specimen 5 mm x 10 mm x 0.2-4 mm; thinner specimens of ~0.08 mm prepared by melting and pressing small pieces zone refined crystals between two parallel glassy carbon plates in vacuum; transmission and reflection measured with uv spectrophotometer; absorption coefficients then deduced; data extracted from a figure.
28	94	Miyata, T. and Tomiki, T.	1967	Z	5.10×10^4-6.36×10^4	18	Same as above.
29	94	Miyata, T. and Tomiki, T.	1967	Z	5.87×10^4-6.33×10^4	70	Same as above.
30	94	Miyata, T. and Tomiki, T.	1967	Z	4.96×10^4-6.12×10^4	95	Same as above.
31	94	Miyata, T. and Tomiki, T.	1967	Z	5.58×10^4-6.30×10^4	95	Same as above.
32	94	Miyata, T. and Tomiki, T.	1967	Z	5.99×10^4-6.13×10^4	195	Same as above.
33	94	Miyata, T. and Tomiki, T.	1967	Z	5.64×10^4-5.98×10^4	298	Same as above.
34	94	Miyata, T. and Tomiki, T.	1967	Z	4.95×10^4-5.99×10^4	298	Same as above.
35	94	Miyata, T. and Tomiki, T.	1967	Z	5.39×10^4-5.74×10^4	473	Same as above.
36	94	Miyata, T. and Tomiki, T.	1967	Z	4.84×10^4-5.74×10^4	473	Same as above.
37	94	Miyata, T. and Tomiki, T.	1967	Z	5.19×10^4-5.60×10^4	573	Same as above.
38	94	Miyata, T. and Tomiki, T.	1967	Z	4.83×10^4-5.60×10^4	573	Same as above.
39	23	Genzel, L., Happ, H., and Weber, R.	1959	T	3.2-33	298	Crystal; plane parallel plate specimens of 1.07, 2.10, 5.0, and 47.5 mm thick; transmission measured and absorption coefficient determined; data extracted from a figure.
40	105	Geick, R.	1962	Z	149-181	298	Evaporated NaCl film of 10 μm thick; samples put in a desiccator for 4 weeks before use; absorption coefficient determined from reflectivity and transmission measurements; data extracted from a figure.

TABLE 23. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF SODIUM CHLORIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
41	105	Geick, R.	1962	Z	60-143	298	Similar to above except for thin specimen shaved from the bulk.
42	106	Cartwright, C.H. and Czerny, M.	1933	Z	83-143	298	Natural NaCl crystal; thin plate specimens of 21.5 to 147 μm thick; absorption coefficients determined from the transmission measurement; data extracted from a table.
43	107	Dötsch, H. and Happ, H.	1964	T	3.2-11	300	Single crystal; plate specimen of 150 mm thick; absorption coefficient determined from transmission measurements; data extracted from a figure.
44	107	Dötsch, H. and Happ, H.	1964	T	3.3-8.2	360	Same as above.
45	107	Dötsch, H. and Happ, H.	1964	T	3.3-8.2	280	Same as above.
46	107	Dötsch, H. and Happ, H.	1964	T	3.3-8.2	200	Same as above.
47	107	Dötsch, H. and Happ, H.	1964	T	3.3-8.2	120	Same as above.
48	107	Dötsch, H. and Happ, H.	1964	T	3.3-8.2	80	Same as above.
49	108	Dianov, E.M. and Irisova, N.A.	1966	T	5	298	Natural crystal; plate specimens of 12 and 18 mm thick; absorption coefficient determined from transmission measurement; data extracted from a table.
50	99	Rosenstock, H.B., Gregory, D.A., and Harrington, J.A.	1976	C	2631.6	298	Single crystals; obtained from the Naval Research Lab., the Harshaw Chemical Co., and the Raytheon Corp.; mechanically polished and chemically cleaned with spectrograde CCl_4; laser calorimetric method used; data extracted from a table; it was found that the surface absorption was about 45 times higher than the bulk absorption.

TABLE 24. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF SODIUM CHLORIDE (Wavenumber Dependence)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

ν	α	ν	α	ν	α	ν	α	ν	α	ν	α
DATA SET 1		DATA SET 1(CONT.)		DATA SET 1(CONT.)		DATA SET 1(CONT.)		DATA SET 1(CONT.)		DATA SET 4	
T = 293.0										T = 293.0	
		1.581E+5	6.350E+5	1.169E+5	1.176E+6	9.673E+4	1.357E+6	6.371E+4	1.145E+6		
2.197E+5	3.952E+5	1.573E+5	6.120E+5	1.165E+5	1.186E+6	9.032E+4	1.365E+6	6.355E+4	1.165E+6	1.360E+2	2.234E+2
2.065E+5	4.415E+5	1.565E+5	5.994E+5	1.161E+5	1.197E+6	8.952E+4	1.170E+6	6.331E+4	1.155E+6	1.292E+2	1.793E+2
2.048E+5	4.376E+5	1.556E+5	5.072E+5	1.153E+5	1.217E+6	8.871E+4	1.037E+6	6.315E+4	1.182E+6	1.219E+2	1.495E+2
2.132E+5	4.537E+5	1.548E+5	5.043E+5	1.149E+5	1.223E+6	8.790E+4	8.610E+5	6.290E+4	1.313E+6	1.095E+2	1.272E+2
2.011E+5	4.553E+5	1.540E+5	5.367E+5	1.145E+5	1.235E+6	8.548E+4	6.016E+5	6.274E+4	1.112E+6	9.997E+1	1.007E+2
2.001E+5	4.542E+5	1.524E+5	6.322E+5	1.137E+5	1.257E+6	8.509E+4	5.640E+5	6.250E+4	1.045E+6	9.333E+1	8.456E+1
1.993E+5	4.595E+5	1.516E+5	6.473E+5	1.129E+5	1.263E+6	8.427E+4	5.719E+5	6.234E+4	9.873E+5		
1.954E+5	5.171E+5	1.508E+5	6.533E+5	1.121E+5	1.266E+6	8.387E+4	5.902E+5	6.210E+4	8.193E+5	DATA SET 5	
1.944E+5	5.373E+5	1.500E+5	6.597E+5	1.112E+5	1.259E+6	8.347E+4	6.186E+5	6.109E+4	4.574E+5	T = 293.0	
1.935E+5	5.534E+5	1.492E+5	6.502E+5	1.105E+5	1.235E+6	8.185E+4	7.200E+5	6.129E+4	2.095E+5		
1.927E+5	5.571E+5	1.484E+5	6.525E+5	1.089E+5	1.163E+6	8.145E+4	7.267E+5	6.059E+4	2.600E+5	6.930E+1	5.713E+1
1.917E+5	5.571E+5	1.470E+5	6.305E+5	1.073E+5	1.092E+6	8.113E+4	7.236E+5	6.048E+4	1.672E+5	5.574E+1	4.354E+1
1.907E+5	5.571E+5	1.468E+5	6.087E+5	1.056E+5	9.824E+5	8.055E+4	7.195E+5	6.063E+4	1.359E+5		
1.915E+5	5.739E+5	1.452E+5	6.402E+5	1.048E+5	9.354E+5	7.903E+4	6.952E+5	5.908E+4	1.125E+5	DATA SET 6	
1.897E+5	5.454E+5	1.427E+5	5.919E+5	1.044E+5	9.137E+5	7.742E+4	6.010E+5	5.887E+4	6.658E+4	T = 293.0	
1.874E+5	5.135E+5	1.411E+5	5.955E+5	1.040E+5	9.151E+5	7.591E+4	6.192E+5	5.805E+4	3.048E+4		
1.871E+5	4.937E+5	1.395E+5	5.901E+5	1.036E+5	9.246E+5	7.419E+4	5.874E+5	5.645E+4	7.094E+3	1.366E+2	2.091E+2
1.863E+5	4.925E+5	1.379E+5	6.239E+5	1.032E+5	9.210E+5	7.258E+4	5.472E+5			1.340E+2	2.134E+2
1.855E+5	4.935E+5	1.371E+5	6.374E+5	1.024E+5	9.653E+5	7.177E+4	5.321E+5	DATA SET 2		1.325E+2	2.254E+2
1.842E+5	5.314E+5	1.363E+5	6.563E+5	1.016E+5	1.034E+6	7.137E+4	5.351E+5	T = 293.0		1.297E+2	1.911E+2
1.823E+5	5.955E+5	1.355E+5	6.470E+5	1.012E+5	1.056E+6	7.056E+4	5.232E+5			1.265E+2	1.472E+2
1.815E+5	6.157E+5	1.347E+5	6.431E+5	1.004E+5	1.060E+6	7.016E+4	5.262E+5	2.857E+2	6.164E+2	1.249E+2	1.597E+2
1.806E+5	6.355E+5	1.331E+5	6.354E+5	1.000E+5	1.063E+6	6.935E+4	5.055E+5	2.773E+2	7.079E+2	1.224E+2	1.592E+2
1.794E+5	6.554E+5	1.323E+5	6.482E+5	9.960E+4	1.064E+6	6.855E+4	4.990E+5	2.703E+2	1.155E+3	1.200E+2	1.455E+2
1.784E+5	6.743E+5	1.315E+5	6.607E+5	9.919E+4	1.060E+6	6.815E+4	4.967E+5	2.632E+2	1.653E+3	1.173E+2	1.274E+2
1.774E+5	6.912E+5	1.305E+5	7.059E+5	9.839E+4	1.025E+6	6.774E+4	4.937E+5	2.564E+2	1.933E+3	1.147E+2	1.237E+2
1.756E+5	7.102E+5	1.293E+5	7.344E+5	9.759E+4	9.687E+5	6.734E+4	4.825E+5	2.503E+2	2.035E+3	1.125E+2	1.237E+2
1.759E+5	7.272E+5	1.232E+5	7.590E+5	9.677E+4	9.607E+5	6.694E+4	4.879E+5	2.439E+2	2.145E+3	1.091E+2	1.234E+2
1.734E+5	6.872E+5	1.200E+5	8.433E+5	9.597E+4	9.527E+5	6.653E+4	4.849E+5	2.326E+2	2.484E+3	1.030E+2	9.952E+1
1.702E+5	6.629E+5	1.250E+5	8.954E+5	9.516E+4	9.567E+5	6.613E+4	4.986E+5	2.174E+2	3.196E+3	5.591E+1	9.745E+1
1.695E+5	6.334E+5	1.242E+5	9.205E+5	9.435E+4	1.020E+6	6.573E+4	5.309E+5			9.323E+1	9.155E+1
1.677E+5	6.324E+5	1.234E+5	9.363E+5	9.395E+4	1.051E+6	6.532E+4	6.074E+5	DATA SET 3		8.834E+1	9.147E+1
1.661E+5	6.263E+5	1.226E+5	9.555E+5	9.355E+4	1.129E+6	6.512E+4	6.551E+5	T = 293.0		8.313E+1	8.094E+1
1.653E+5	6.441E+5	1.202E+5	1.012E+6	9.315E+4	1.241E+6	6.492E+4	7.261E+5			7.516E+1	7.556E+1
1.645E+5	6.755E+5	1.194E+5	1.035E+6	9.274E+4	1.329E+6	6.476E+4	8.056E+5	1.531E+2	5.966E+2	7.182E+1	6.271E+1
1.621E+5	6.722E+5	1.185E+5	1.117E+6	9.234E+4	1.381E+6	6.452E+4	8.916E+5	1.422E+2	4.469E+2	6.177E+1	5.231E+1
1.613E+5	6.891E+5	1.181E+5	1.143E+6	9.194E+4	1.398E+6	6.435E+4	9.543E+5	1.364E+2	1.337E+2	5.574E+1	[illegible]
1.609E+5	6.857E+5	1.177E+5	1.154E+6	9.153E+4	1.415E+6	6.411E+4	1.039E+6	6.579E+1	5.291E+1	5.110E+1	3.807E+1
1.597E+5	6.822E+5	1.173E+5	1.165E+6	9.113E+4	1.397E+6	6.395E+4	1.093E+6			4.535E+1	2.410E+1

TABLE 24. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF SODIUM CHLORIDE (Wavenumber Dependence) (continued)

DATA SET 7
T = 293.0

ν	α
7.794E+1	7.325E+1
6.859E+1	6.425E+1
6.159E+1	5.462E+1
5.510E+1	3.693E+1
4.964E+1	3.392E+1
4.478E+1	2.725E+1

DATA SET 8
T = 293.0

ν	α
5.244E+1	3.796E+1
4.793E+1	3.375E+1
4.286E+1	2.111E+1

DATA SET 9
T = 293.0

ν	α
9.091E+2	1.771E-3
8.396E+2	6.995E-3
7.758E+2	2.603E-2
7.143E+2	8.908E-2

DATA SET 10
T = 300.0

ν	α
6.970E+2	1.100E-1
6.650E+2	2.000E-1
6.360E+2	3.500E-1
6.060E+2	5.000E-1
5.840E+2	9.000E-1
5.650E+2	1.210E+0
5.430E+2	1.700E+0
5.240E+2	2.440E+0
5.190E+2	2.570E+0
5.030E+2	3.410E+0
4.940E+2	4.010E+0
4.840E+2	4.550E+0
4.750E+2	5.240E+0
4.630E+2	6.210E+0

DATA SET 10 (CONT.)

ν	α
4.550E+2	7.240E+0
4.440E+2	8.630E+0

DATA SET 11
T = 6[illegible]5.0

ν	α
7.370E+2	1.500E-1
7.050E+2	2.800E-1
6.760E+2	5.130E-1
6.590E+2	7.650E-1
6.300E+2	1.080E+0
6.100E+2	1.500E+0
5.950E+2	2.190E+0
5.740E+2	2.960E+0
5.640E+2	3.560E+0
5.530E+2	4.200E+0
5.440E+2	4.940E+0
5.340E+2	5.790E+0
5.230E+2	6.890E+0
5.120E+2	8.390E+0

DATA SET 12
T = 775.0

ν	α
7.050E+2	2.000E-1
7.350E+2	3.200E-1
7.000E+2	5.100E-1
6.700E+2	8.400E-1
6.500E+2	1.150E+0
6.350E+2	1.600E+0
6.170E+2	2.200E+0
5.940E+2	3.090E+0
5.840E+2	3.540E+0
5.750E+2	4.160E+0
5.640E+2	4.830E+0
5.550E+2	5.820E+0
5.450E+2	6.950E+0
5.330E+2	8.280E+0
5.250E+2	9.420E+0

DATA SET 13
T = 935.0

ν	α
8.070E+2	1.060E-1
7.700E+2	2.000E-1
7.460E+2	4.300E-1
7.160E+2	6.710E-1
6.860E+2	1.060E+0
6.670E+2	1.410E+0
6.470E+2	1.840E+0
6.260E+2	2.510E+0
6.060E+2	3.230E+0
5.950E+2	3.960E+0
5.840E+2	4.590E+0
5.740E+2	5.330E+0
5.640E+2	6.320E+0
5.550E+2	7.450E+0
5.430E+2	9.160E+0

DATA SET 14
T = 1105.0

ν	α
8.570E+2	1.400E-1
8.260E+2	2.100E-1
7.970E+2	3.100E-1
7.650E+2	5.100E-1
7.370E+2	7.600E-1
7.060E+2	1.120E+0
6.870E+2	1.510E+0
6.670E+2	2.030E+0
6.470E+2	2.730E+0
6.260E+2	3.690E+0
6.050E+2	4.790E+0
5.950E+2	5.850E+0
5.860E+2	6.680E+0
5.740E+2	7.830E+0
5.640E+2	9.510E+0

DATA SET 15
T = 300.0

ν	α
8.511E+2	4.600E-3

DATA SET 15 (CONT.)

ν	α
8.000E+2	1.400E-2
7.508E+2	4.190E-2
6.995E+2	1.091E-1
6.510E+2	2.741E-1
6.020E+2	5.708E-1
5.510E+2	1.294E+0
5.010E+2	2.500E+0

DATA SET 16
T = 10.0

ν	α
6.482E+4	1.040E+6
6.469E+4	9.886E+5
6.459E+4	1.199E+6
6.447E+4	1.056E+6
6.435E+4	2.244E+6
6.425E+4	2.773E+6
6.411E+4	8.185E+5
6.406E+4	3.236E+5
6.398E+4	1.766E+5
6.384E+4	3.420E+4
6.378E+4	1.722E+4

DATA SET 17
T = 1.8

ν	α
1.600E+2	1.000E+1
1.590E+2	6.067E+0
1.570E+2	5.453E+0
1.550E+2	5.039E+0
1.530E+2	3.396E+0
1.510E+2	2.838E+0
1.500E+2	2.754E+0
1.490E+2	2.773E+0
1.480E+2	2.851E+0
1.460E+2	3.192E+0
1.450E+2	3.214E+0
1.440E+2	3.096E+0
1.380E+2	1.429E+0
1.370E+2	1.327E+0

DATA SET 17 (CONT.)

ν	α
1.360E+2	1.219E+0
1.350E+2	8.492E-1
1.340E+2	7.883E-1
1.330E+2	7.129E-1
1.320E+2	7.179E-1
1.290E+2	7.780E-1
1.270E+2	8.375E-1
1.250E+2	8.892E-1
1.240E+2	9.750E-1
1.230E+2	1.072E+0
1.220E+2	1.062E+0
1.200E+2	6.383E-1
1.190E+2	6.067E-1
1.180E+2	5.943E-1
1.170E+2	6.950E-1
1.160E+2	6.577E-1
1.150E+2	5.508E-1
1.140E+2	4.999E-1
1.100E+2	3.650E-1
1.090E+2	3.396E-1
1.080E+2	3.214E-1
1.070E+2	3.006E-1
1.030E+2	2.360E-1
1.000E+2	1.965E-1
9.300E+1	1.169E-1

DATA SET 18
T = 298.0

ν	α
4.000E+0	2.128E-3
1.247E+0	5.916E-4
3.090E-1	1.432E-4

DATA SET 19
T = 285.0

ν	α
5.331E+4	1.581E+1
5.815E+4	1.682E+1
5.798E+4	7.770E+0
5.782E+4	6.100E+0

DATA SET 19 (CONT.)

ν	α
5.774E+4	4.810E+0
5.760E+4	3.690E+0
5.750E+4	3.520E+0
5.742E+4	3.050E+0
5.718E+4	2.680E+0
5.677E+4	2.040E+0
5.653E+4	[illegible]
5.550E+4	1.490E+0
5.500E+4	1.430E+0
5.427E+4	[illegible]
5.375E+4	[illegible]
5.323E+4	1.200E+0
5.256E+4	1.030E+0
5.177E+4	1.130E+0
5.013E+4	9.400E-1
5.005E+4	7.600E-1
4.992E+4	6.700E-1
4.935E+4	6.700E-1
4.875E+4	4.900E-1
4.860E+4	4.900E-1
4.755E+4	4.300E-1
4.532E+4	4.100E-1
4.427E+4	3.140E-1
4.339E+4	1.300E-1

DATA SET 20
T = 298.0

ν	α
9.434E+3	7.000E-6

DATA SET 21
T = 298.0

ν	α
1.079E+3	2.000E-4
9.434E+2	1.000E-3

DATA SET 22
T = 298.0

ν	α
3.571E+3	5.800E-5

TABLE 24. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF SODIUM CHLORIDE (Wavenumber Dependence) (continued)

ν	α
DATA SET 22(CONT.)	
2.632E+3	5.300E-5
1.887E+3	5.100E-5
1.079E+3	3.000E-4
9.434E+2	[illegible]E-3
DATA SET 23	
T = 293.0	
1.079E+3	4.100E-4
9.434E+2	1.000E-3
DATA SET 24	
T = 293.0	
3.571E+3	6.900E-5
2.632E+3	6.500E-5
1.887E+3	3.400E-5
1.079E+3	8.800E-4
9.434E+2	1.400E-3
DATA SET 25	
T = 300.0	
4.490E+2	9.450E+0
4.790E+2	5.120E+0
4.990E+2	3.600E+0
5.190E+2	2.470E+0
5.420E+2	1.770E+0
5.570E+2	1.130E+0
5.750E+2	9.030E-1
5.960E+2	6.100E-1
6.150E+2	4.120E-1
6.390E+2	2.990E-1
6.540E+2	2.110E-1
6.790E+2	1.350E-1
6.990E+2	1.020E-1
7.190E+2	6.560E-2
7.370E+2	4.390E-2
7.570E+2	2.810E-2
7.760E+2	1.790E-2
DATA SET 25(CONT.)	
7.960E+2	1.280E-2
8.150E+2	6.180E-3
8.350E+2	5.530E-3
8.590E+2	3.530E-3
8.790E+2	2.320E-3
DATA SET 26	
T = 30.0	
4.100E+2	3.250E+0
4.300E+2	2.330E+0
4.500E+2	1.700E+0
4.790E+2	1.200E+0
4.990E+2	1.010E+0
5.180E+2	7.600E-1
5.380E+2	6.080E-1
5.380E+2	4.850E-1
5.570E+2	3.470E-1
5.570E+2	2.930E-1
5.770E+2	2.210E-1
5.770E+2	1.770E-1
5.960E+2	1.590E-1
5.920E+2	1.310E-1
6.110E+2	1.070E-1
6.160E+2	6.110E-2
6.300E+2	6.470E-2
6.350E+2	4.130E-2
6.550E+2	4.020E-2
6.700E+2	3.700E-2
6.600E+2	2.360E-2
6.390E+2	2.230E-2
6.840E+2	1.080E-2
7.130E+2	1.210E-2
DATA SET 27	
T = 1[illegible]	
6.073E+4	1.330E+0
6.137E+4	1.880E+0
6.145E+4	2.100E+0
DATA SET 27(CONT.)	
6.161E+4	2.190E+0
6.169E+4	2.460E+0
6.200E+4	3.690E+0
6.218E+4	3.610E+0
6.234E+4	4.210E+0
6.242E+4	4.910E+0
6.258E+4	6.920E+0
6.282E+4	8.380E+0
6.282E+4	1.050E+1
6.296E+4	1.430E+1
6.315E+4	2.270E+1
6.323E+4	2.940E+1
6.331E+4	4.030E+1
6.347E+4	5.910E+1
6.[illegible]55E+4	9.710E+1
DATA SET 28	
T = 10.	
5.105E+4	1.130E+0
5.129E+4	1.130E+0
5.185E+4	2.530E+0
5.331E+4	5.680E+0
5.387E+4	6.640E+0
5.597E+4	5.750E+0
5.645E+4	4.590E+0
5.742E+4	2.910E+0
5.758E+4	2.700E+0
5.806E+4	2.150E+0
5.855E+4	1.590E+0
5.879E+4	1.420E+0
6.000E+4	1.600E+0
6.081E+4	2.640E+0
6.051E+4	3.190E+0
6.121E+4	4.870E+0
6.137E+4	5.470E+0
6.161E+4	7.720E+0
6.202E+4	1.010E+1
6.218E+4	1.650E+1
6.234E+4	1.870E+1
DATA SET 28(CONT.)	
6.266E+4	2.440E+1
6.282E+4	3.060E+1
6.315E+4	4.020E+1
6.339E+4	6.370E+1
6.355E+4	1.370E+2
DATA SET 29	
T = 70.0	
6.185E+4	3.740E+0
6.159E+4	3.600E+0
6.161E+4	3.090E+0
6.153E+4	3.330E+0
6.137E+4	2.860E+0
6.145E+4	2.650E+0
6.121E+4	2.450E+0
6.113E+4	2.450E+0
6.105E+4	2.100E+0
6.0[illegible]E+4	1.090E+0
6.000E+4	9.020E-1
6.000E+4	9.020E-1
5.871E+4	5.250E-1
5.871E+4	3.450E-1
6.331E+4	1.720E+2
6.331E+4	1.270E+2
6.331E+4	1.090E+2
DATA SET 30	
T = 95.0	
4.900E+4	3.850E-1
4.900E+4	3.490E-1
5.073E+4	1.220E+0
5.129E+4	1.930E+0
5.177E+4	2.340E+0
5.218E+4	3.570E+0
5.266E+4	4.080E+0
5.337E+4	6.040E+0
5.589E+4	5.750E+0
5.645E+4	4.590E+0
DATA SET 30(CONT.)	
5.742E+4	2.910E+0
5.758E+4	2.800E+0
5.798E+4	2.150E+0
5.855E+4	1.590E+0
5.879E+4	1.470E+0
6.000E+4	1.060E+0
6.073E+4	2.640E+0
6.081E+4	3.190E+0
6.121E+4	4.690E+0
DATA SET 31	
T = 95.0	
5.589E+4	5.750E+0
5.742E+4	3.950E+0
5.798E+4	3.270E+0
5.815E+4	3.150E+0
5.855E+4	2.920E+0
5.879E+4	2.720E+0
5.903E+4	2.430E+0
6.000E+4	2.260E+0
6.032E+4	2.260E+0
6.056E+4	2.440E+0
6.121E+4	5.900E+0
6.145E+4	7.720E+0
6.202E+4	1.060E+1
6.218E+4	1.570E+1
6.234E+4	2.530E+1
6.242E+4	2.840E+1
6.250E+4	3.310E+1
6.266E+4	4.020E+1
6.274E+4	5.050E+1
6.293E+4	8.970E+1
6.298E+4	9.590E+1
6.366E+4	1.650E+2
DATA SET 32	
T = 195.0	
5.992E+4	2.230E+0
DATA SET 32(CONT.)	
6.000E+4	2.410E+0
6.0[illegible]E+4	2.700E+0
6.016E+4	2.910E+0
6.032E+4	3.030E+0
6.040E+4	3.540E+0
6.040E+4	4.450E+0
6.056E+4	5.340E+0
6.065E+4	6.240E+0
6.073E+4	7.910E+0
6.081E+4	9.950E+0
6.089E+4	1.250E+1
6.097E+4	1.640E+1
6.113E+4	3.660E+1
6.113E+4	4.600E+1
6.121E+4	6.260E+1
6.129E+4	1.080E+2
DATA SET 33	
T = 295.0	
5.645E+4	1.330E-1
5.742E+4	3.030E-1
5.806E+4	1.050E+0
5.823E+4	1.500E+0
5.855E+4	5.350E+0
5.879E+4	1.050E+1
5.897E+4	1.600E+1
5.903E+4	2.890E+1
5.927E+4	4.540E+1
5.944E+4	7.470E+1
5.960E+4	1.450E+2
5.960E+4	1.870E+2
5.975E+4	2.270E+2
5.984E+4	2.850E+2
5.984E+4	3.330E+2
5.984E+4	4.230E+2

TABLE 24. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF SODIUM CHLORIDE (Wavenumber Dependence) (continued)

DATA SET 34
T = 293.

ν	α
4.932E+4	1.110E+0
4.952E+4	1.130E+0
4.984E+4	1.310E+0
5.012E+4	1.910E+0
5.097E+4	2.420E+0
5.145E+4	2.340E+0
5.137E+4	3.420E+0
5.194E+4	4.010E+0
5.226E+4	4.500E+0
5.252E+4	4.830E+0
5.395E+4	5.740E+0
5.444E+4	5.700E+0
5.532E+4	5.373E+0
5.556E+4	5.130E+0
5.597E+4	4.830E+0
5.653E+4	4.450E+0
5.714E+4	3.720E+0
5.742E+4	3.590E+0
5.782E+4	3.470E+0
5.798E+4	3.750E+0
5.815E+4	4.720E+0
5.855E+4	9.780E+0
5.871E+4	1.220E+1
5.879E+4	1.330E+1
5.897E+4	1.810E+1
5.895E+4	2.650E+1
5.927E+4	4.540E+1
5.944E+4	7.470E+1
5.950E+4	1.490E+2
5.960E+4	1.610E+2
5.959E+4	2.130E+2
5.954E+4	2.850E+2
5.976E+4	3.590E+2
5.992E+4	4.350E+2

DATA SET 35
T = 473.

ν	α
5.395E+4	2.060E-1

DATA SET 35(CONT.)

ν	α
5.444E+4	5.380E-1
5.470E+4	1.150E+0
5.532E+4	4.440E+0
5.556E+4	7.030E+0
5.597E+4	1.400E+1
5.613E+4	1.910E+1
5.621E+4	2.590E+1
5.641E+4	5.380E+1
5.653E+4	6.030E+1
5.677E+4	8.200E+1
5.694E+4	1.400E+2
5.702E+4	1.510E+2
5.742E+4	4.260E+2

DATA SET 36
T = 473.

ν	α
4.347E+4	9.460E-1
4.847E+4	9.460E+0
4.927E+4	1.030E+0
5.032E+4	3.020E+0
5.137E+4	4.300E+0
5.242E+4	5.590E+0
5.395E+4	6.130E+0
5.476E+4	6.000E+0
5.540E+4	8.830E+0
5.556E+4	1.160E+1
5.589E+4	1.900E+1
5.613E+4	2.800E+1
5.653E+4	5.370E+1
5.653E+4	6.030E+1
5.669E+4	8.190E+1
5.685E+4	1.430E+2
5.702E+4	1.030E+2
5.742E+4	4.100E+2

DATA SET 37
T = 573.

ν	α
5.194E+4	2.460E-1

DATA SET 37(CONT.)

ν	α
5.234E+4	3.610E-1
5.274E+4	1.020E+0
5.298E+4	1.280E+0
5.339E+4	2.560E+0
5.387E+4	8.440E+0
5.444E+4	2.370E+1
5.484E+4	4.380E+1
5.532E+4	1.230E+2
5.548E+4	1.660E+2
5.597E+4	4.210E+2

DATA SET 38
T = 573.

ν	α
4.831E+4	1.140E+0
4.847E+4	1.230E+0
4.935E+4	2.650E+0
5.032E+4	3.390E+0
5.137E+4	4.470E+0
5.202E+4	6.140E+0
5.339E+4	8.650E+0
5.387E+4	1.140E+1
5.444E+4	2.560E+1
5.464E+4	4.380E+1
5.484E+4	4.730E+1
5.532E+4	1.230E+2
5.556E+4	1.680E+2
5.597E+4	4.060E+2

DATA SET 39
T = 293.0

ν	α
3.311E+1	1.423E+1
2.451E+1	7.858E+0
2.242E+1	6.537E+0
2.012E+1	5.714E+0
1.821E+1	4.669E+0
1.661E+1	3.653E+0
1.437E+1	2.780E+0
1.337E+1	2.470E+0

DATA SET 39(CONT.)

ν	α
1.253E+1	2.140E+0
1.115E+1	1.541E+0
1.008E+1	1.253E+0
9.091E+0	1.080E+0
8.403E+0	9.356E-1
7.143E+0	5.978E-1
6.329E+0	4.621E-1
5.587E+0	3.619E-1
4.695E+0	2.578E-1
3.984E+0	2.228E-1
3.155E+0	1.312E-1

DATA SET 40
T = 298.0

ν	α
1.818E+2	9.391E+3
1.786E+2	1.055E+4
1.754E+2	1.164E+4
1.724E+2	1.369E+4
1.695E+2	1.431E+4
1.667E+2	1.573E+4
1.639E+2	1.337E+4
1.613E+2	7.216E+3
1.587E+2	4.029E+3
1.563E+2	2.631E+3
1.538E+2	1.682E+3
1.515E+2	1.219E+3
1.493E+2	9.613E+2

DATA SET 41
T = 298.0

ν	α
1.429E+2	4.542E+2
1.389E+2	3.421E+2
1.351E+2	2.564E+2
1.316E+2	2.083E+2
1.282E+2	1.804E+2
1.250E+2	1.571E+2
1.220E+2	1.410E+2
1.190E+2	1.287E+2

DATA SET 41(CONT.)

ν	α
1.163E+2	1.213E+2
1.136E+2	1.140E+2
1.111E+2	1.075E+2
1.087E+2	1.024E+2
1.064E+2	9.893E+1
1.042E+2	9.425E+1
1.020E+2	9.114E+1
1.000E+2	8.746E+1
9.804E+1	8.511E+1
9.615E+1	8.327E+1
9.434E+1	8.180E+1
9.259E+1	8.029E+1
9.091E+1	7.997E+1
8.929E+1	7.854E+1
8.772E+1	7.826E+1
8.621E+1	7.692E+1
8.475E+1	7.668E+1
8.333E+1	7.645E+1
8.197E+1	7.519E+1
8.065E+1	7.499E+1
7.937E+1	7.480E+1
7.813E+1	7.363E+1
7.692E+1	7.250E+1
7.576E+1	7.141E+1
7.463E+1	7.035E+1
7.353E+1	6.938E+1
7.246E+1	6.739E+1
7.143E+1	6.552E+1
7.042E+1	6.372E+1
6.944E+1	6.190E+1
6.849E+1	6.025E+1
6.757E+1	5.944E+1
6.667E+1	5.781E+1
6.579E+1	5.622E+1
6.494E+1	5.467E+1
6.410E+1	5.317E+1
6.329E+1	5.249E+1
6.250E+1	5.105E+1
6.173E+1	4.965E+1
6.098E+1	4.827E+1

DATA SET 41(CONT.)

ν	α
6.024E+1	4.709E+1

DATA SET 42
T = 298.0

ν	α
1.429E+2	3.231E+2
1.379E+2	2.635E+2
1.333E+2	2.228E+2
1.290E+2	1.897E+2
1.250E+2	1.665E+2
1.176E+2	1.434E+2
1.111E+2	1.243E+2
1.053E+2	1.124E+2
1.000E+2	1.043E+2
9.524E+1	9.654E+1
9.091E+1	9.139E+1
8.696E+1	8.742E+1
8.333E+1	8.378E+1

DATA SET 43
T = 3[illegible]0.0

ν	α
3.236E+0	7.122E-2
4.310E+0	1.348E-1
5.376E+0	2.226E-1
6.452E+0	3.272E-1
7.519E+0	4.801E-1
8.621E+0	6.483E-1
9.709E+0	9.254E-1
1.087E+1	1.147E+0

DATA SET 44
T = 360.0

ν	α
3.342E+0	8.458E-2
4.944E+0	2.015E-1
6.622E+0	3.929E-1
8.195E+0	6.351E-1

TABLE 24. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF SODIUM CHLORIDE (Wavenumber Dependence) (continued)

ν	α
DATA SET 45	
T = 2[illegible]	
3.342E+3	6.459E-2
4.944E+3	1.532E-1
6.622E+3	3.156E-1
8.195E+3	5.27[illegible]E-1
DATA SET 46	
T = 2[illegible].0	
3.342E+3	5.505E-2
4.944E+3	9.831E-2
6.622E+3	2.174E-1
8.195E+3	3.816E-1
DATA SET 47	
T = [illegible]	
3.342E+3	[illegible]E-2
4.944E+3	4.775E-2
6.622E+3	1.077E-1
8.195E+3	1.935E-1
DATA SET 48	
T = 9[illegible]	
3.342E+3	1.175E-2
4.944E+3	2.94[illegible]E-2
6.622E+3	6.[illegible]4[illegible]E-2
8.195E+3	[illegible]E-1
DATA SET 49	
T = 295.0	
5.300E+3	1.822E-1
DATA SET 50	
T = 295.0	
2.632E+3	9.00[illegible]E-4

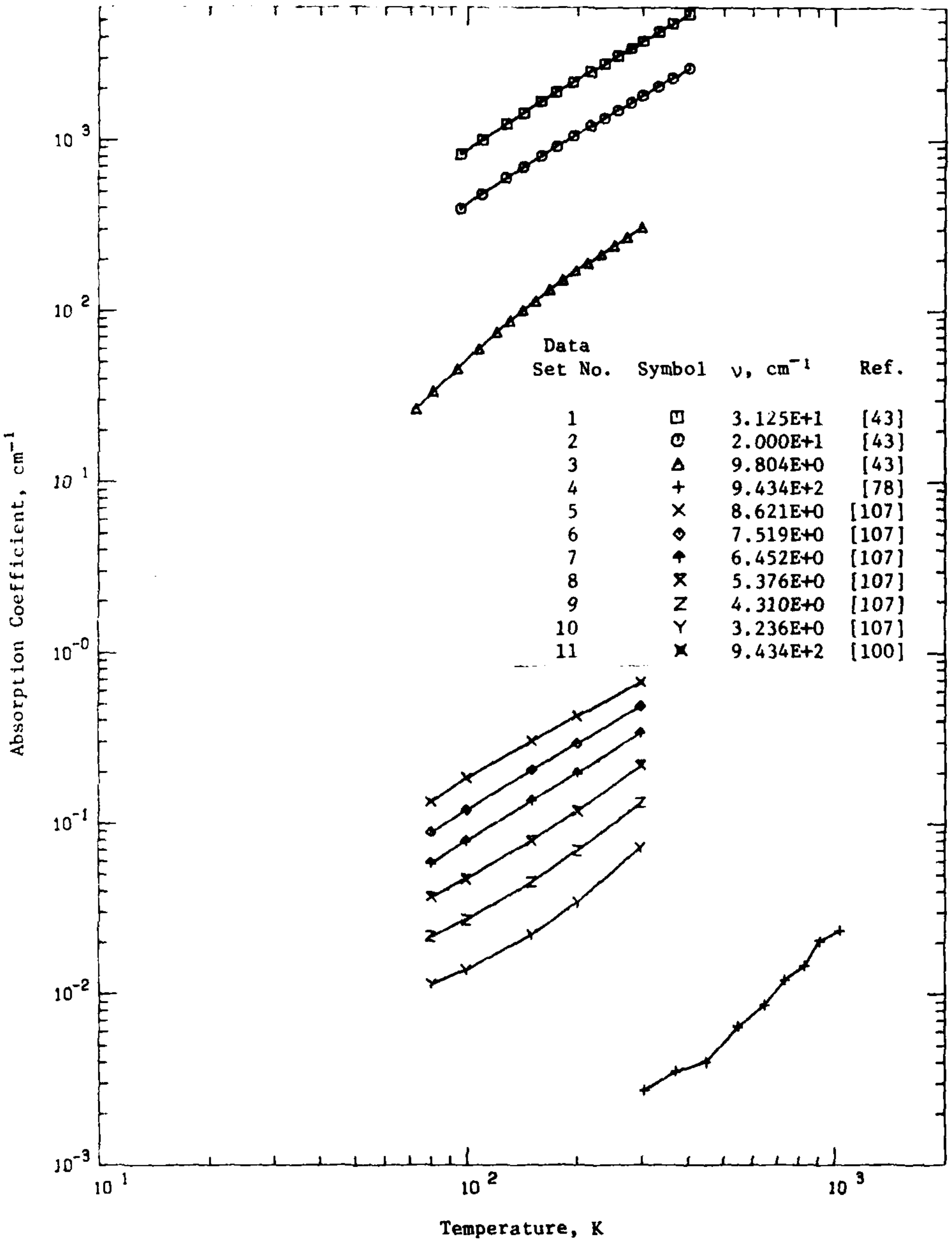

Figure 18. Absorption Coefficient of Sodium Chloride (Temperature Dependence)

TABLE 25. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF SODIUM CHLORIDE (Temperature Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	43	Stolen, R. and Dransfeld, K.	1965	T	31.25	96-402	High purity; single crystal; grown by the Bridgman method; plate specimens of thickness from 0.5 to 25.0 mm; absorption coefficients directly determined; data extracted from a figure.
2	43	Stolen, R. and Dransfeld, K.	1965	T	20	96-402	Same as above.
3	43	Stolen, R. and Dransfeld, K.	1965	T	9.804	96-402	Same as above.
4	72	Harrington, J.A. and Hass, M.	1973	C	943.4	304-1035	Single crystal; specimen with surfaces mechanically and then chemically polished; absorption coefficients measured by calorimetric method using a CO_2 laser source; data extracted from a figure.
5	107	Dötsch, H. and Happ, H.	1964	T	8.62	80-297	Single crystal; plate specimen of 150 mm thick; absorption coefficients determined from transmission measurements; data extracted from a figure.
6	107	Dötsch, H. and Happ, H.	1964	T	7.52	80-297	Same as above.
7	107	Dötsch, H. and Happ, H.	1964	T	6.45	80-297	Same as above.
8	107	Dötsch, H. and Happ, H.	1964	T	5.38	80-297	Same as above.
9	107	Dötsch, H. and Happ, H.	1964	T	4.21	80-297	Same as above.
10	107	Dötsch, H. and Happ, H.	1964	T	3.24	80-297	Same as above.
11	100	Rowe, J.M. and Harrington, J.A.	1976	C	943.4	100-300	Single crystals; grown by the reactive-atmosphere-process; obtained from the Naval Research Lab.; rod specimens of 2.5 cm diameter and of various lengths; chemically etched surface; bulk absorption determined; data extracted from a figure; data at low temperature carried large uncertainty of ±100%; uncertainty diminished toward higher temperatures.

TABLE 26. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF SODIUM CHLORIDE (Temperature Dependence)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

DATA SET 1
ν = 3.129E+1

T	α
95.0	8.254E+2
110.0	1.0[illegible]E+3
124.0	1.245E+3
143.0	1.443E+3
159.0	1.597E+3
179.0	1.934E+3
199.0	2.037E+3
217.0	2.553E+3
237.0	2.925E+3
257.0	3.133E+3
279.0	3.495E+3
300.0	3.911E+3
332.0	4.315E+3
362.0	4.527E+3
402.0	5.493E+3

DATA SET 2
ν = 2.[illegible]E+1

T	α
95.0	3.954E+2
110.0	4.531E+2
124.0	5.771E+2
143.0	6.931E+2
159.0	8.115E+2
179.0	9.151E+2
199.0	1.055E+3
217.0	1.225E+3
237.0	1.339E+3
257.0	1.505E+3
279.0	1.524E+3
300.0	1.930E+3
332.0	2.074E+3
362.0	2.349E+3
402.0	2.641E+3

DATA SET 3
ν = 9.3[illegible]E+0

T	α
73.0	2.073E+1

DATA SET 3 (CONT.)

T	α
81.0	3.379E+1
94.0	4.543E+1
108.0	6.029E+1
122.0	7.491E+1
131.0	8.710E+1
146.0	1.049E+2
154.0	1.147E+2
168.0	1.335E+2
183.0	1.517E+2
193.0	1.713E+2
213.0	1.911E+2
232.0	2.151E+2
250.0	2.424E+2
273.0	2.719E+2
300.0	3.090E+2

DATA SET 4
ν = 3.434E+2

T	α
304.0	2.740E-3
370.5	3.530E-3
443.7	4.010E-3
545.2	6.450E-3
647.1	8.090E-3
734.5	1.207E-2
829.5	1.475E-2
916.2	2.050E-2
1035.1	2.300E-2

DATA SET 5
ν = 9.621E+0

T	α
80.0	1.344E-1
99.7	1.496E-1
150.3	3.007E-1
200.0	4.273E-1
296.5	6.772E-1

DATA SET 6
ν = 7.519E+0

T	α
80.0	8.879E-2
99.7	1.233E-1
150.3	2.076E-1
200.0	2.954E-1
296.5	4.924E-1

DATA SET 7
ν = 6.452E+0

T	α
80.0	5.860E-2
99.7	7.923E-2
150.3	1.373E-1
200.0	1.981E-1
296.5	3.426E-1

DATA SET 8
ν = 5.376E+0

T	α
80.0	3.703E-2
99.7	4.728E-2
150.3	7.951E-2
200.0	1.184E-1
296.5	2.201E-1

DATA SET 9
ν = 4.310E+0

T	α
80.0	2.166E-2
99.7	2.727E-2
150.3	4.536E-2
200.0	6.945E-2
296.5	1.333E-1

DATA SET 10
ν = 3.236E+0

T	α
80.0	1.143E-2
99.7	1.390E-2
150.3	2.235E-2

DATA SET 10 (CONT.)

T	α
200.0	3.461E-2
296.5	7.281E-2

DATA SET 11
ν = 9.434E+2

T	α
100.0	1.420E-4
124.0	1.560E-4
149.0	1.800E-4
174.0	2.160E-4
199.0	2.710E-4
223.0	3.480E-4
248.0	4.610E-4
273.0	6.360E-4
299.0	8.910E-4

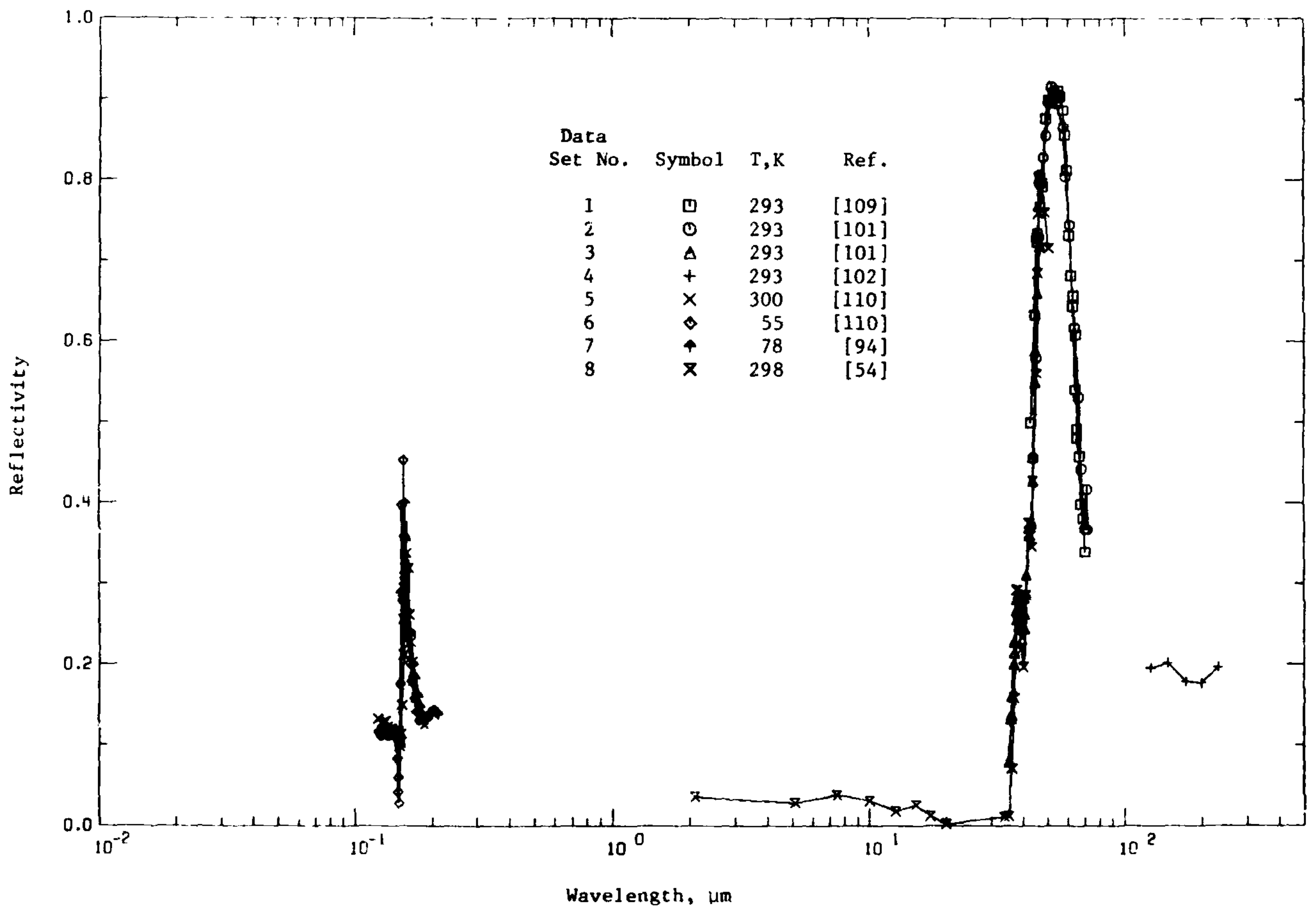

Figure 19. Reflectivity of Sodium Chloride

TABLE 27. SUMMARY OF MEASUREMENTS ON THE REFLECTIVITY OF SODIUM CHLORIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	109	Barnes, R.B. and Czerny, M.	1931	R	43-70.0	293	Crystal; plate specimen; normal spectral reflectivity obtained; silver mirror used as reference; data extracted from a figure; temperature not given, 293 K assumed.
2	101	Czerny, M.	1930	R	44.0-71.4	293	Crystal; plate specimen of about 30 x 40 mm^2; polished top surface; normal spectral reflectivity obtained with a silver mirror as reference; data extracted from a figure; temperature not given, 293 K assumed.
3	101	Czerny, M.	1930	R	35.0-47.0	293	Same as above.
4	102	Cartwright, C.H. and Czerny, M.	1934	R	126.0-231.0	293	Bulk NaCl; surface conditions unspecified; near normal reflectivities obtained; linearly averaged values of the tabulated data extracted.
5	110	Baldini, G. and Bosacchi, B.	1968	R	0.124-0.187	300	Single crystal; specimen with cleaved surface; back surface of the specimen treated with an emery cloth to reduce the reflection from the back; near normal reflectivity obtained with specimen in vacuum; data extracted from a figure.
6	110	Baldini, G. and Bosacchi, B.	1968	R	0.124-0.179	55	Same as above except at a low temperature.
7	94	Miyata, T. and Tomiki, T.	1967	R	0.157-0.212	78	Single crystal; obtained from the Harshaw Chemical Co. or grown by zone refined from melt; cleaved specimens of 8 mm x 10 mm x 0.2-4 mm; near normal reflectivity measured by an ultra violet spectrophotometer; data extracted from a curve.
8	54	McCarthy, D.E.	1963	T	2.1-50.4	298	Synthetic crystal; plate specimen of 5 cm thick; ground and polished to a flatness of seven fringes or better on both sides; incident angle 30°; data extracted from a figure.

TABLE 28. EXPERIMENTAL DATA ON THE REFLECTIVITY OF SODIUM CHLORIDE

[Wavelength, λ, μm; Temperature, T, K; Reflectivity, ρ]

λ	ρ
DATA SET 1	
T = 293.0	
43.0	0.5[illegible]
44.5	0.633
45.4	0.724
45.7	0.734
45.9	0.757
49.0	0.7[illegible]2
[illegible]	0.[illegible]75
5[illegible].3	0.533
51.4	0.5[illegible]
52.6	0.4[illegible]
53.7	0.4[illegible]
54.9	0.[illegible]2
5[illegible].9	0.[illegible]
56.0	0.[illegible]
57.2	0.[illegible]7
5[illegible].4	0.[illegible]
59.5	0.[illegible]3
60.7	0.7[illegible]2
61.9	0.652
63.6	0.657
6[illegible].0	0.644
64.1	0.541
64.2	0.[illegible]
[illegible].3	0.[illegible]2
[illegible].3	0.451
[illegible].0	0.455
[illegible].0	0.349
6[illegible].5	0.391
7[illegible]	0.339
DATA SET 2	
T = 293.0	
44.0	0.456
44.9	0.[illegible]
45.6	0.72[illegible]
46.3	0.729
46.8	0.8[illegible]5
47.1	0.795

λ	ρ
DATA SET 2(CONT.)	
48.1	0.828
49.3	0.855
51.8	0.910
54.0	0.895
57.4	0.806
59.9	0.8[illegible]5
60.9	0.745
63.4	0.617
65.9	0.531
68.0	0.442
69.9	0.398
71.3	0.417
71.4	0.367
DATA SET 3	
T = 293.0	
35.2	0.079
36.0	0.133
36.1	0.137
36.2	0.160
36.9	0.2[illegible]
37.0	0.214
37.[illegible]	0.227
37.7	0.23[illegible]
37.9	0.256
37.9	0.265
37.9	0.281
38.0	0.201
38.6	0.288
38.7	0.246
39.7	0.253
39.5	0.257
39.5	0.269
39.6	0.231
40.4	0.262
40.4	0.282
40.5	0.244
41.2	0.288
41.3	0.311

λ	ρ
DATA SET 3(CONT.)	
42.1	0.360
42.2	0.369
43.0	0.374
43.1	0.377
43.8	0.427
43.9	0.457
44.7	0.549
44.8	0.588
45.7	0.659
46.6	0.718
DATA SET 4	
T = 293.0	
120.0	0.196
147.0	0.202
174.0	0.179
2[illegible].0	0.177
231.0	0.197
DATA SET 5	
T = 300.0	
0.124	0.1324
0.129	0.1273
0.130	0.1273
0.131	0.1297
0.132	0.1297
0.135	0.1233
0.137	0.1197
0.140	0.1197
0.141	0.1169
0.145	0.1169
0.149	0.1119
0.150	0.0983
0.151	0.1028
0.152	0.1145
0.153	0.1496
0.155	0.2114
0.155	0.2565

λ	ρ
DATA SET 5(CONT.)	
0.156	0.2945
0.157	0.3185
0.159	0.3373
0.162	0.3192
0.163	0.2612
0.165	0.2270
0.167	0.2028
0.169	0.1795
0.174	0.1588
0.178	0.1445
0.183	0.1330
0.187	0.1256
DATA SET 6	
T = 55.0	
0.124	0.1164
0.126	0.1114
0.128	0.1114
0.131	0.1167
0.132	0.1167
0.134	0.1119
0.136	0.1119
0.137	0.1148
0.139	0.1148
0.140	0.1137
0.142	0.1169
0.144	0.1169
0.145	0.1117
0.146	0.1076
0.147	0.0833
0.148	0.0602
0.148	0.0416
0.149	0.0283
0.150	0.1011
0.151	0.1754
0.152	0.2891
0.153	0.3973
0.154	0.2786
0.155	0.4530

λ	ρ
DATA SET 6(CONT.)	
0.156	0.3531
0.157	0.3069
0.158	0.2673
0.160	0.2334
0.164	0.2024
0.167	0.1791
0.171	0.1531
0.175	0.1416
0.179	0.1309
DATA SET 7	
T = 78.0	
0.1575	0.400
0.1580	0.354
0.1585	0.315
0.1600	0.265
0.1614	0.240
0.1619	0.237
0.1622	0.236
0.1630	0.238
0.1633	0.240
0.1638	0.240
0.1642	0.239
0.1648	0.235
0.1693	0.200
0.1725	0.183
0.1770	0.160
0.1800	0.147
0.1830	0.138
0.1853	0.133
0.1867	0.131
0.1909	0.131
0.1927	0.133
0.1962	0.137
0.1981	0.140
0.2000	0.141
0.2012	0.143
0.2026	0.144
0.2043	0.144

λ	ρ
DATA SET 7(CONT.)	
0.2063	0.142
0.2085	0.141
0.2101	0.[illegible]98
0.2109	0.142
0.21[illegible]9	0.138
DATA SET 8	
T = 298.0	
2.1	0.[illegible]36
5.1	0.[illegible]23
7.5	0.[illegible]35
1[illegible].0	0.[illegible]31
12.7	0.[illegible]28
15.2	0.[illegible]26
17.3	0.012
2[illegible]	0.[illegible]
[illegible].7	0.[illegible]11
35.[illegible]	0.[illegible]
36.1	0.071
37.[illegible]	0.[illegible]
37.5	0.255
37.9	0.[illegible]
38.4	0.25[illegible]
39.2	0.2[illegible]9
40.1	0.257
41.1	0.29[illegible]
42.2	0.375
42.5	0.375
42.9	0.38[illegible]
43.3	0.34[illegible]
44.0	0.427
45.2	0.560
45.5	0.685
46.2	0.759
46.4	0.8[illegible]3
46.9	0.[illegible]3
47.8	0.796
48.9	0.760
50.3	0.716

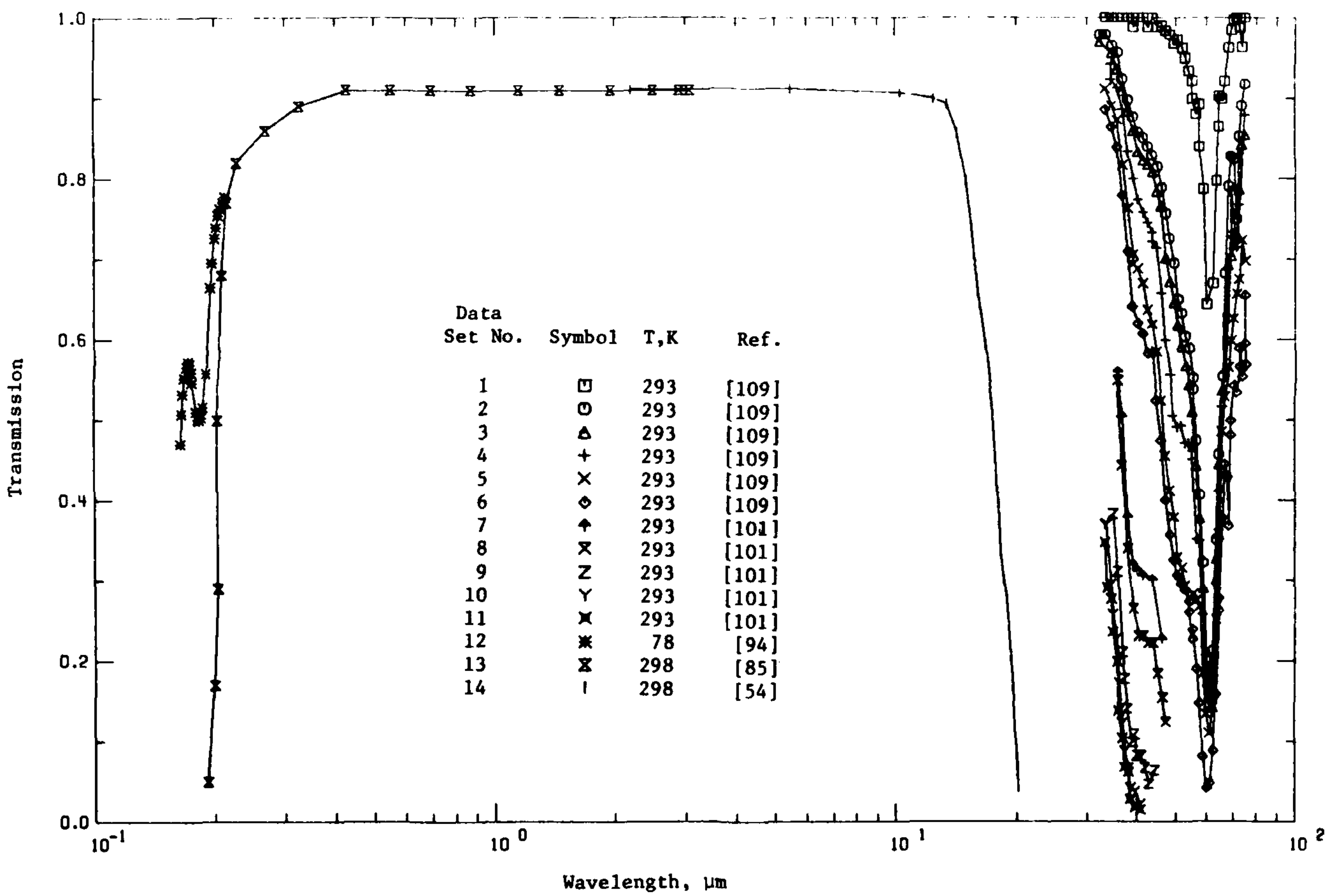

Figure 20. Transmission of Sodium Chloride

TABLE 29. SUMMARY OF MEASUREMENTS ON THE TRANSMISSION OF SODIUM CHLORIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	109	Barnes, R.B. and Czerny, M.	1931	T	33.5-74.7	293	Vacuum evaporated thin film specimen of 0.17 mm thick on celluloid substrate; transmittance spectrum obtained; data extracted from a figure.
2	109	Barnes, R.B. and Czerny, M.	1931	T	32.3-75.0	293	Same as above except for specimen of 1.35 mm thick.
3	109	Barnes, R.B. and Czerny, M.	1931	T	32.3-75.0	293	Same as above except for specimen of 1.7 mm thick.
4	109	Barnes, R.B. and Czerny, M.	1931	T	34.6-75.0	293	Same as above except for specimen of 2.3 mm thick.
5	109	Barnes, R.B. and Czerny, M.	1931	T	33.5-75.0	293	Same as above except for specimen of 3.4 mm thick.
6	109	Barnes, R.B. and Czerny, M.	1931	T	33.5-75.0	293	Same as above except for specimen of 3.6 mm thick.
7	101	Czerny, M.	1930	T	35.8-46.3	293	Crystal; plate specimen of 8 mm thick; spectral transmittance obtained; data extracted from a figure; temperature not given; 293 K assumed.
8	101	Czerny, M.	1930	T	35.8-47.4	293	Same as above except for other specimen of some thickness.
9	101	Czerny, M.	1930	T	35.0-44.3	293	Same as above except for other specimen of 14 mm thick.
10	101	Czerny, M.	1930	T	33.4-40.8	293	Same as above except for other specimen of 19 mm thick.
11	101	Czerny, M.	1930	T	35.8-46.3	293	Same as above except for other specimen of 24 mm thick.
12	94	Miyata, T. and Tomiki, T.	1967	R	0.159-0.213	78	Single crystal; obtained from Harshaw Chemical Co. or grown by zone refined from melt; cleave specimens of 0.63 mm thick; transmission determined by an ultraviolet spectrophotometer; data extracted from a curve.
13	85	McCarthy, D.E.	1967	T	0.17-3.0	298	Synthetic crystal; plate specimen of 5.0 mm thick with surfaces parallel to within 0.001 mm/mm of length and flat to within 10 fringes or better of the mercury green line; measurements made on double-beam instruments with accuracy of ±2%; data extracted from a figure; temperature not given, 298 K assumed.
14	54	McCarthy, D.E.	1963	T	2.0-21.0	298	Synthetic crystal; plate specimen of 5 cm thick; ground and polished to a flatness of seven fringes or better on both sides; data extracted from a figure.

TABLE 30. EXPERIMENTAL DATA ON THE TRANSMISSION OF SODIUM CHLORIDE

(Wavelength, λ, μm; Temperature, T, K; Transmission, τ)

λ	τ
DATA SET 1	
T = 293.0	
33.5	1.000
34.7	[illegible]
35.8	[illegible]
36.9	[illegible]
38.0	[illegible]
39.2	[illegible]
39.2	[illegible]
40.3	[illegible]
41.0	[illegible]
42.0	[illegible]
43.0	[illegible]
45.0	[illegible]
46.1	[illegible]
47.3	[illegible]
48.4	[illegible]
49.6	[illegible]
50.7	[illegible]
52.0	[illegible]
53.0	[illegible]
54.2	[illegible]
55.3	[illegible]
55.3	[illegible]
55.5	[illegible]
57.6	[illegible]
57.6	[illegible]
58.5	0.737
60.0	0.544
62.2	0.57[illegible]
63.4	[illegible]
64.5	[illegible]
64.8	[illegible]
65.7	[illegible]
65.8	0.921
68.0	0.303
69.1	0.335
70.2	0.333
71.3	[illegible]
72.6	0.346
73.7	0.304

λ	τ
DATA SET 1 (CONT.)	
74.7	1.000
DATA SET 2	
T = 293.0	
32.3	0.979
33.6	0.973
34.7	0.966
35.9	0.957
36.9	0.924
38.1	0.898
39.2	0.877
40.3	0.858
41.0	0.851
42.7	0.840
43.7	0.829
45.0	0.815
46.2	0.789
47.3	0.757
48.3	[illegible]
49.7	0.695
50.8	0.651
51.9	0.633
53.0	[illegible]
54.2	0.539
55.2	0.552
55.4	0.538
56.6	0.474
57.6	0.407
58.5	0.322
59.9	0.221
60.1	0.171
62.2	0.213
63.5	0.351
64.5	0.457
65.7	0.554
66.4	0.692
68.0	0.791
69.1	0.826
70.2	0.825

λ	τ
DATA SET 2 (CONT.)	
71.3	0.750
72.6	0.653
73.7	0.891
75.0	0.918
DATA SET 3	
T = 293.0	
32.3	0.970
34.6	0.956
35.8	0.936
36.9	0.949
38.1	0.934
39.2	[illegible]
40.4	0.833
41.5	0.823
42.6	0.818
43.6	0.808
44.9	0.784
46.0	0.766
47.3	0.751
48.4	0.672
49.6	0.645
50.7	0.618
51.8	0.591
53.0	0.567
54.1	0.544
55.3	0.510
56.5	0.443
57.6	0.378
58.8	0.291
59.9	0.155
61.1	0.155
62.2	0.197
63.4	0.331
63.4	0.327
64.6	0.445
65.7	0.537
67.9	0.693
69.1	0.704

λ	τ
DATA SET 3 (CONT.)	
70.2	0.716
70.2	0.732
71.4	0.736
72.5	0.780
73.7	0.842
75.0	0.854
DATA SET 4	
T = 293.0	
34.6	0.943
34.6	0.923
35.8	0.913
36.9	0.886
37.1	0.834
39.2	[illegible]
40.3	0.774
41.6	0.756
42.6	0.745
43.6	0.733
43.8	0.722
44.9	0.714
46.1	0.657
47.2	0.599
48.4	0.557
49.5	0.505
50.7	0.491
51.9	0.493
53.0	0.471
54.2	0.471
55.3	0.462
55.3	0.451
56.6	0.351
57.6	0.356
58.7	0.258
59.9	0.109
61.1	0.141
62.2	0.132
64.5	0.411
65.6	0.517

λ	τ
DATA SET 4 (CONT.)	
67.9	0.63[illegible]
69.1	0.734
69.2	0.735
71.3	0.715
72.5	0.768
75.0	0.879
DATA SET 5	
T = 293.0	
33.5	0.912
34.7	0.891
35.8	0.873
36.9	0.817
38.1	0.753
39.2	0.710
39.2	0.694
40.3	0.633
41.5	0.670
42.6	0.637
43.8	0.613
44.9	0.535
46.1	0.504
47.3	0.455
48.4	0.412
49.6	0.379
50.7	0.329
52.0	0.310
53.0	0.234
55.4	0.283
56.5	0.275
57.7	0.250
58.8	0.185
59.9	0.134
61.1	0.110
62.2	0.142
63.4	0.252
64.5	0.353
65.7	0.480
66.8	0.529

λ	τ
DATA SET 5 (CONT.)	
67.5	0.566
69.1	0.599
70.2	0.626
71.4	0.657
72.5	0.675
73.7	0.724
75.0	0.695
DATA SET 6	
T = 293.0	
33.5	0.386
34.7	0.504
35.8	[illegible]
40.3	0.779
38.0	[illegible]
39.1	0.641
40.4	0.620
41.5	0.5[illegible]7
42.6	0.563
43.8	0.583
44.9	0.524
46.1	0.474
47.3	[illegible]
48.5	0.257
49.6	0.325
50.6	[illegible]
51.9	0.296
53.0	0.285
54.2	0.274
54.2	0.201
55.3	0.227
55.5	0.234
56.5	0.190
57.6	0.147
58.7	0.081
60.0	0.042
61.1	0.049
62.2	0.068
63.4	0.158

TABLE 30. EXPERIMENTAL DATA ON THE TRANSMISSION OF SODIUM CHLORIDE (continued)

λ	τ
DATA SET 6(CONT.)	
[illegible]	0.253
64.5	0.275
65.7	0.374
66.6	0.445
67.9	0.428
68.1	0.353
[illegible]	[illegible]
[illegible]	[illegible]
70.2	[illegible]
71.4	0.534
72.5	0.505
73.5	[illegible]
7[illegible].6	[illegible]
[illegible]	[illegible]
75.[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
DATA SET 7	
T = 293.0	
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	0.374
39.3	0.324
[illegible]	[illegible]
[illegible]	0.306
[illegible]	[illegible]
[illegible]	0.227
DATA SET 8	
T = 293.0	
35.[illegible]	[illegible]
[illegible]	0.443
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
42.9	0.222

λ	τ
DATA SET 8(CONT.)	
44.0	0.222
45.2	0.184
46.4	0.154
47.4	0.124
DATA SET 9	
T = 293.0	
35.0	0.363
35.9	0.321
36.9	0.211
37.3	0.174
38.0	0.141
39.0	0.099
[illegible]	[illegible]
[illegible]	[illegible]
41.0	0.032
41.9	0.067
42.9	0.047
44.5	0.004
DATA SET 10	
T = 293.0	
33.4	0.370
33.7	0.370
34.0	0.295
34.9	0.258
35.8	0.229
36.1	0.173
36.9	0.123
37.3	0.138
38.1	0.107
38.5	0.062
39.6	0.036
40.[illegible]	0.022

λ	τ
DATA SET 11	
T = 293.0	
33.4	0.347
33.8	0.291
34.6	0.277
34.9	0.236
35.6	0.199
36.1	0.133
36.9	0.104
37.3	0.063
38.1	0.052
38.5	0.028
39.6	0.019
40.8	0.015
DATA SET 12	
T = 73.0	
0.1645	0.470
0.1654	0.507
0.1665	0.532
[illegible]	0.552
[illegible]	0.556
[illegible]	0.572
0.1722	0.569
0.1744	0.559
0.1756	0.546
[illegible]	0.513
[illegible]	0.501
0.1831	[illegible]
[illegible]	0.503
0.1871	0.515
[illegible]	[illegible]
[illegible]	0.665
0.1971	0.675
[illegible]	0.726
[illegible]	0.739
0.2040	0.754
[illegible]	0.762
[illegible]	0.772
0.2122	0.777

λ	τ
DATA SET 13	
T = 300.0	
0.191	0.05
0.199	0.17
0.203	0.29
0.203	0.56
0.208	0.66
0.214	0.77
0.227	0.82
0.269	0.86
0.327	0.89
0.428	0.91
0.552	0.91
0.696	0.91
0.876	0.91
1.15	0.91
1.46	0.91
1.96	0.91
2.50	0.91
2.93	0.91
3.08	0.91
DATA SET 14	
T = 293.0	
2.2	0.911
5.5	0.912
10.3	0.907
12.5	0.900
13.5	0.855
14.3	0.857
15.0	0.798
15.5	0.739
16.1	0.659
16.8	0.593
17.4	0.520
17.8	0.453
18.1	0.395
18.5	0.336
18.9	0.277
19.3	0.219

λ	τ
DATA SET 14(CONT.)	
19.6	0.157
20.0	0.107
20.2	0.043

TABLE 31. PEAK POSITIONS (λ_{max}) IN μm AND HALF-WIDTHS (W) IN eV FOR THE F, R, M, AND N ABSORPTION BANDS IN SODIUM CHLORIDE*

Interionic dist., d (Å)	Temp.	F band λ_{max}	F band W	R_1 band λ_{max}	R_2 band λ_{max}	M band λ_{max}	M band W	N bands λ_{max}
2.81	RT	(0.471)†		(0.547)	(0.592)	(0.701)		
		0.458	0.46			0.720		
		0.465	0.47			0.725		
		0.466	0.49					
		0.470	0.50					
	NT	0.448	0.28	0.545	0.596	0.706		0.823
		0.450	0.31			0.713		
		0.452	0.41					
	HT	0.450	0.25					
			0.28					
			0.29					

* Values were taken from Ref. [69].

† Values given in parentheses are calculated from the Ivey relations [70].

F band $\lambda_{max} = 703\ d^{1.84}$ for NaCl structure, $\lambda_{max} = 251\ d^{2.5}$ for CsCl structure.

R_1 band $\lambda_{max} = 816\ d^{1.84}$

R_2 band $\lambda_{max} = 884\ d^{1.84}$

M band $\lambda_{max} = 1400\ d^{1.56}$

TABLE 32. RECOMMENDED VALUES ON ABSORPTION COEFFICIENT OF SODIUM CHLORIDE IN IR REGION AT 300 K

ν, cm^{-1}	λ, μm	Absorption Coefficient, cm^{-1}	
		Intrinsic*	Observed† (Selected)
4.000E+02	25.0	1.9E+1	
5.000E+02	20.0	3.2E+0	
5.010E+02	20.0	3.1E+0	2.5E+0
5.510E+02	18.1	1.2E+0	1.2E+0
6.000E+02	16.7	5.3E-1	
6.020E+02	16.6	5.2E-1	5.7E-1
6.510E+02	15.4	2.1E-1	2.7E-1
6.998E+02	14.3	9.0E-2	1.0E-1
7.000E+02	14.3	9.0E-2	
7.508E+02	13.3	3.6E-2	4.1E-2
8.000E+02	12.5	1.5E-2	1.4E-2
8.511E+02	11.7	6.0E-3	4.6E-3
9.000E+02	11.1	2.5E-3	
9.434E+02	10.6	1.1E-3	1.0E-3
1.000E+03	10.0	4.2E-4	
1.079E+03	9.27	1.0E-4	2.6E-4
1.100E+03	9.09	7.1E-5	
1.200E+03	8.33	1.1E-5	
1.300E+03	7.69	2.0E-6	
1.400E+03	7.14	3.3E-7	
1.500E+03	6.67	5.6E-8	
1.600E+03	6.25	9.4E-9	
1.700E+03	5.88	1.5E-9	
1.800E+03	5.56	2.6E-10	
1.887E+03	5.30	5.6E-11	3.4E-5
2.632E+03	3.80	9.4E-17	5.3E-5

*Intrinsic values were calculated according to Eq. (29) with uncertainties about ±10%.

†Values in this column are the total absorption coefficient which are either lowest reported or those used to define the constants in Eq. (29). Uncertainties of these values are about ±10%. Values lower than 1.0E-3 carry higher uncertainties up to ±30%.

3.4. Potassium Chloride, KCl

Potassium chloride is widely used in spectroscopy, since its optical properties make it à convenient window and prism material over the spectrum from the ultraviolet to the infrared. The transmission range is about 0.21 to 30 μm. A plate 1 cm in thickness transmits radiation up to 24 μm. Since strong absorption occurs near the transmission limits, the transmission range of KCl is about 0.38 to 21 μm. Of all the substances which are otherwise suitable for optical parts, KCl is transparent over the widest range of the infrared spectrum.

KCl crystals are grown in the same way as NaCl, but sometimes multiple crystals instead of single-crystal ingots result. Therefore, large prisms are somewhat rare and expensive. As crystal growth techniques improved, crystals 30 cm in diameter are now available.

Measurement of the refractive index of potassium chloride dates back to 1871, when Stefan [86] determined the refractive index of a sylvite prism for the B, D, and F of Fraunhofer lines. Later work, represented by Rubens [112], Martens [87], Paschen [88], and Gyulai [27], provided a large amount of data in the transparent region. Measurements beyond the transparent region were not made until 1934 when Cartwright et al. [102] analyzed the reflection and transmission spectra of KCl thin films in the infrared region, 126 to 232 μm. In the low ultraviolet region, Tomiki [113] published values obtained by analyzing the reflection spectra. Refractive index data are now available for a wide wavelength range from 0.106 to 232 μm.

Li [33] reduced the then available experimental data on the refractive index to a common temperature of 293 K and after careful evaluation and analysis adopted a Sellmeier type dispersion equation to calculate the refractive index at 293 K in the wavelength range of 0.18-35.0 μm:

$$n^2 = 1.26486 + \frac{0.30523\,\lambda^2}{\lambda^2-(0.100)^2} + \frac{0.41620\,\lambda^2}{\lambda^2-(0.131)^2} + \frac{0.18870\,\lambda^2}{\lambda^2-(0.162)^2} + \frac{2.62[illegible]\,\lambda^2}{\lambda^2-(70.42)^2} \quad (30)$$

where λ is in units of μm.

Investigations of absorption coefficient for practical applications are generally classified into three wavelength regions: the ultraviolet and the

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far infrared limits of the transparent region, and the transparent regions. In the ultraviolet region, the main motivation for the study was to investigate and to determine the Urbach-rule parameters.

Roessler and Walker [91] determined the absorption index for KCl, in the spectral range from 0.047 to 0.248 μm, by a Kramers-Kronig analysis of the reflectance spectrum. Evidenced by the strong temperature dependence of reflectance in the exciton region and the appearance of spin-orbit split doublets, the surfaces of the KCl specimen examined were near perfect. Kobayashi and Tomiki [93] studied the effects of impurities on the absorption coefficient and found significant shifts in the position of the fundamental absorption edge and an absorption band at 0.204 μm. The latter is due to the presence of OH ion as an impurity in KCl grown in air. However, the shift of the position of the edge may not be caused by the OH ions; it may be due to the presence of bromine and/or dislocation in the crystals. Tomiki [114] and Tomiki et al. [77] studied the absorption of KCl in the wavelength region between 0.1 and 0.4 μm for the purpose of determining the Urbach-rule parameters and finding the features characteristic of the intrinsic tail. Through a systematic observation and analysis made at various temperatures they found the following empirical relations between some parameters

$E_o = 7.834$ eV

$\alpha_o = 1.26 \times 10^{10}$ cm^{-1}

$hf = 13.5$ meV

$\sigma_{so} = 0.745$

for the expression of absorption coefficient of the intrinsic tail

$$\alpha = \alpha_o \exp\left[-\sigma_s(T)\,(E_o-E)/kT\right] \tag{31}$$

where

$$\sigma_s(T) = \sigma_{so}\,\frac{2kT}{hf}\,\tanh\frac{hf}{2kT}$$

Measurements of the absorption coefficient for the infrared transparent region are just recent occurrences as the development of high-power IR lasers has led to a need for better characterization of IR window materials. Among other things, the absorption coefficient plays a decisive role in determining whether a material is adequate for laser optical components. For this reason, absorption coefficients of a number of selected materials were investigated at wavelengths of laser interest. Potassium chloride is among the best laser

window materials and its absorption coefficients at wavelengths 1.06, 2.7, 3.8, 5.3, and 10.6 μm were intensively studied in order to determine the influencing factors that contribute to the extrinsic absorption. These studies are very informative and provide clues and means for material preparation and parts fabrication in order to minimize the extrinsic components in the absorption.

To see whether or not certain intrinsic mechanical and optical properties at 10.6 μm could be achieved with the polycrystalline KCl, investigations were made on KCl specimens with various dopants. Shrader [115] observed that while the 10.6 μm absorption coefficients of the tested specimens were, in general, about the same magnitude as that of a pure KCl sample, 8.9×10^{-4} cm^{-1}, the absorption coefficients of doped KCl in the uv region are very much higher than the pure specimen.

Hass et al. [116] studied the infrared absorption in KCl single crystals near 10.6 μm using calorimetric techniques. They were able to separate the surface and bulk absorptions and a value of 8×10^{-5} cm^{-1} was assigned to the bulk part which is close to the estimated intrinsic limit of the crystal. They also found that an absorption band near 9.8 μm was present in all samples examined and appeared to be largely contributed by the surface absorption. The existence of this surface absorption band prevents observation of the intrinsic. They concluded that careful preparation and finishing of KCl crystals can give a near intrinsic absorption level at 10.6 μm.

Harrington and Hass [78] investigated the temperature dependence of multiphonon absorption at 10.6 μm for KCl samples. The absorption coefficient and its temperature dependence have been observed to vary markedly from sample to sample. In most cases, the absorption coefficient below 600 K is essentially independent of temperature. For purer samples the absorption coefficient increases more sharply at higher temperatures as would be expected for intrinsic behavior.

Boyer et al.[117] studied the temperature dependence of the absorption coefficients of pure KCl crystals at 10.6 μm from room temperature to within 50 K of the melting point, using laser calorimetric techniques. Crystals from a number of different sources were employed and the lowest absorption coefficient was observed with a crystal grown in a CCl_4 reactive atmosphere designed to minimize the introduction of oxygen-containing impurities. The temperature

dependence of the absorption is observed to be very sensitive to impurities, but for the best crystal with the lowest absorption, the dependence monotonically increases, which is anticipated for near-intrinsic absorption of the crystal. However, there always exists a surface absorption band at 9.5 μm whose wing contributes to the total absorption at 10.6 μm. When this surface component is subtracted, the bulk absorption coefficient is 8×10^{-5} cm^{-1}, which is in good agreement with other investigations. It has been experienced by many workers that the surface absorption can be considerably reduced by appropriate chemical polishing.

Deutsch [12], using a differential technique with a dual beam spectrometer, obtained absorption coefficients in the wavelength range from 13.3 to 32 μm for both single crystals and polycrystalline KCl provided by different suppliers. It was found that within the accuracy of the measurement, the long wavelength absorption coefficients of the polycrystalline KCl are the same as those of the single crystal. Furthermore, it was also found that the experimental data could be represented by an exponential relation of the form

$$\alpha = \alpha_o \exp(-\nu/\nu_o) \qquad (32)$$

where

$$\alpha_o = 8696 \text{ cm}^{-1} \qquad \text{and} \qquad \nu_o = 50.8 \text{ cm}^{-1}$$

This relation was believed to represent the intrinsic absorption of KCl. The extrapolated absorption coefficient at 10.6 μm is approximately 8×10^{-5} cm^{-1}, which is somewhat lower than the measured values, 5×10^{-4} cm^{-1} and 3.5×10^{-4} cm^{-1}, for high purity samples. In a later study, Deutsch [118] reported the CO_2 laser calorimeter measurements on the 5.3 and 10.6 μm absorption coefficients of numerous KCl crystals with provisions made to eliminate the effect of surface absorption. One of the crystals showed a 10.6 μm absorption coefficient of $6.6 \pm 2 \times 10^{-5}$ cm^{-1} which corresponded to the predicted intrinsic value by the exponential relation, Eq. (32). It was then estimated the surface absorption to be $1.1 \pm 2 \times 10^{-4}$ per surface and, thus, the total absorption was dominated by surface loss. The lowest value of the 5.3 μm absorption coefficient he obtained was 1.5×10^{-5} cm^{-1}.

Hass et al. [119] measured absorption coefficients by calorimetric techniques at 1.06, 2.7, and 3.8 μm for a number of KCl samples. The results at 1.06 μm are generally in the 10^{-5} cm^{-1} range with the lowest reported at 7×10^{-6} cm^{-1}

which is very close to the limit of the method used. However, at wavelengths 2.7 and 3.8 μm, their best measurements were 3.7×10^{-4} cm^{-1} and 2.1×10^{-4} cm^{-1}, respectively. Compared with the absorption coefficients at 1.06 and 5.3 μm, the data imply excess absorption at 2.7 and 3.8 μm even in the purest available crystals. This has been observed not only in the KCl crystals but also in a number of low absorption alkali halide and alkaline earth fluoride crystals. The cause of such excessive absorption was not understood. They suggested the possibility of being attributable to the OH and CH impurities. If these were eliminated, the absorption level at these wavelengths could be reduced to 10^{-5} cm^{-1} range or lower.

Klein [120] investigated the origins of the extrinsic absorption at 2.7 and 3.8 μm. Correlation with vacuum-ultraviolet absorption measurements indicated that all of the excess 2.7 μm absorption can be accounted for by the OH^- content of the crystals. At 3.8 μm, the surplus absorption in the specimens are most likely contributed by the carbon-oxygen lineages, e.g., COF_2, CO_3^{-2}, HCO_3. Klein suggested that diminished residual absorption at these wavelengths can be achieved by substituting hydrogen chloride for carbon tetrachloride in purification procedures and treating the salt below its melting point.

Hass et al. [97] used an improved laser calorimetric technique in the determination of the 10.6 μm absorption coefficient of the material. As time elapses, the effect of surface absorptions and other contributions is reflected by the increase of slope at equilibrium. As a consequence, the surface and bulk absorptions can be separated by this technique. The bulk 10.6 μm absorption coefficient of KCl obtained by this method is 8×10^{-5} cm^{-1}.

The currently available lowest bulk absorption coefficients of KCl in the laser wavelength region were obtained by Allen and Harrington [98]. Since all of their calorimetric measurements were performed on one pure sample and at one laboratory, their results provided a more consistent and exact description of the dependence of the absorption on laser wavelength. All of their results are below 6×10^{-5} cm^{-1} level with the lowest value, observed at 5.3 μm, of 5×10^{-7} cm^{-1} which is at the limit of their instrument sensitivity. Earlier investigations of wavelength dependence of absorption by Rowe and Harrington [121] and others yielded considerably higher results than this data set.

It has been found that the following facts are common to all of the measurements in the laser wavelength region:

1. Surface absorption predominates at low bulk absorption levels. As a consequence, the observed total absorption is higher than the bulk. The surface absorption band at 9.6 μm is strong enough to mask the intrinsic behavior of the crystal in the wavelength region centered at 9.6 μm.

2. Absorption due to impurities contributes to bulk absorption as well as to surface absorption. At wavelengths 2.8 μm and 3.8 μm, absorptions due to hydroxyl ion and oxygen impurities are particularly outstanding.

3. It appears that the above mentioned extrinsic absorptions may render the crystal an unfavorable window material. It has been found, however, that the objectionable extrinsic absorption can be reduced through improved purification and polishing processes.

4. Low total and bulk absorptions, of the order of 10^{-6} cm^{-1} or less, were found, at wavelengths 1.03 and 5.3 μm. Although this value is still very much higher than the respective intrinsic limits, the results represent the limit of instrument sensitivity. Were the sensitivity of the instrument increased considerably, one might be able to observe very low absorption.

Figures 21 to 24 are plots of the available data. The pertinent information for each data source and the corresponding original values are given in Tables 33 to 36. In addition, available information and data on the reflectivity and transmission are also presented in the same manner (in Figures 25 and 26 and Tables 37 to 40), for completeness and comparison. For the visible and near visible regions, Table 41 gives the spectral positions of the well known color centers. Noticeable absorptions are likely to occur at these centers when the crystal is exposed to ultraviolet, x-ray, or high energy radiation. However, these absorption bands may disappear at high temperatures or by appropriate radiation, corresponding to the so-called "thermal and optical bleaching of color centers."

The recommended values given in Table 42 were calculated from Eq. (32). In the range between 10 to 32 μm, these values are supported by measurements

of Deutsch [12]. At other laser wavelengths, the observed values are generally higher than the calculated ones because of extrinsic contributions due to surface contamination and impurities. Current research has shown that the extrinsic absorptions can be reduced through improved techniques of sample preparation. Therefore, intrinsic values may serve useful purposes. It should be noted that the values in the "intrinsic" column are the lowest limits that we can obtain for ideal samples. In practice, the observed values are generally higher than the limiting values at low absorption levels. Unless values appear in the "observed" column, the limiting values are considered as guidelines for estimation and investigation.

Although it was not the intent of this study to evaluate the absorption data in the vacuum ultraviolet region, in order to provide the users a total picture of the available absorption data, plots of available data in this region are given in the Appendix of this report.

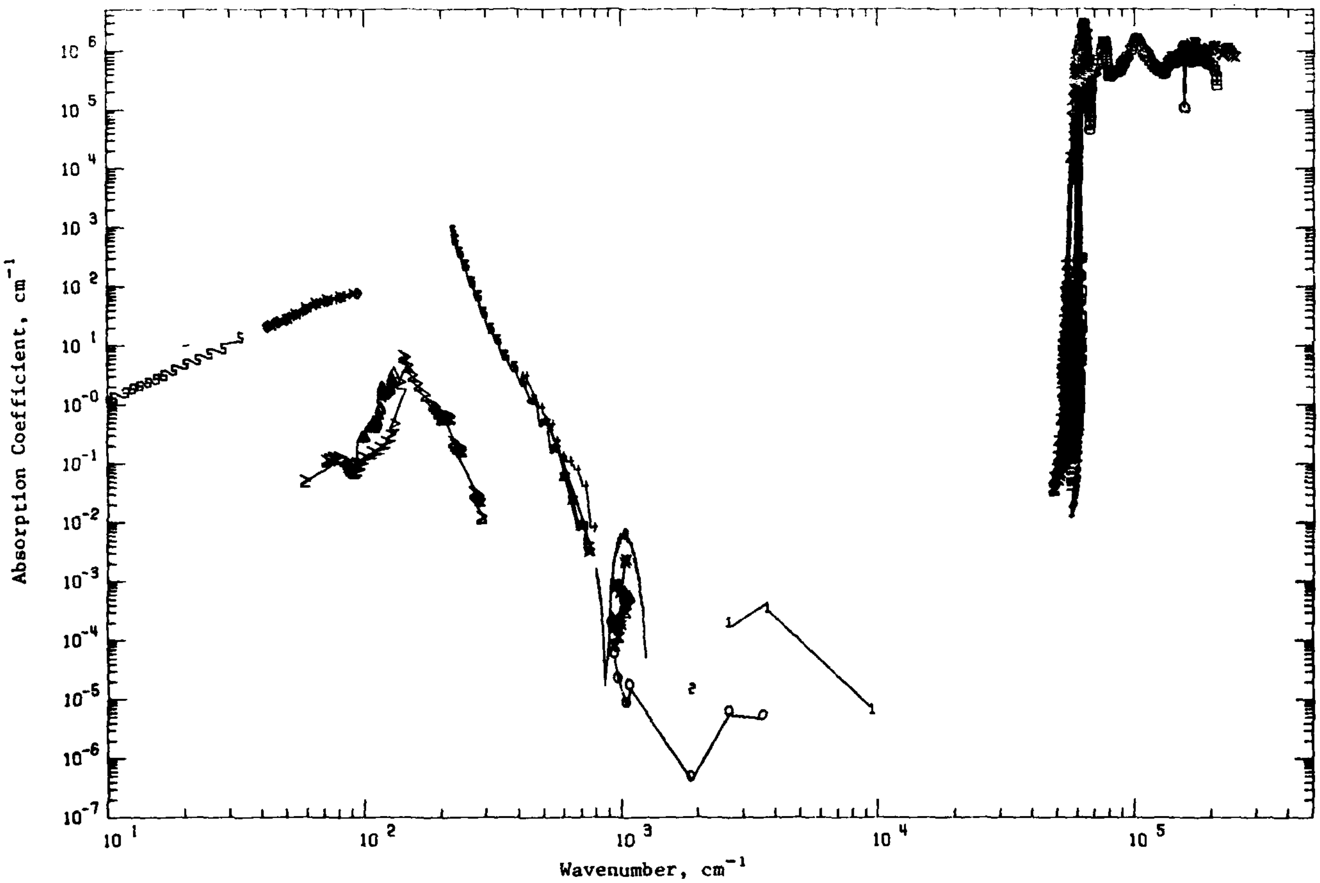

Figure 21. Absorption Coefficient of Potassium Chloride (Wavenumber Dependence)

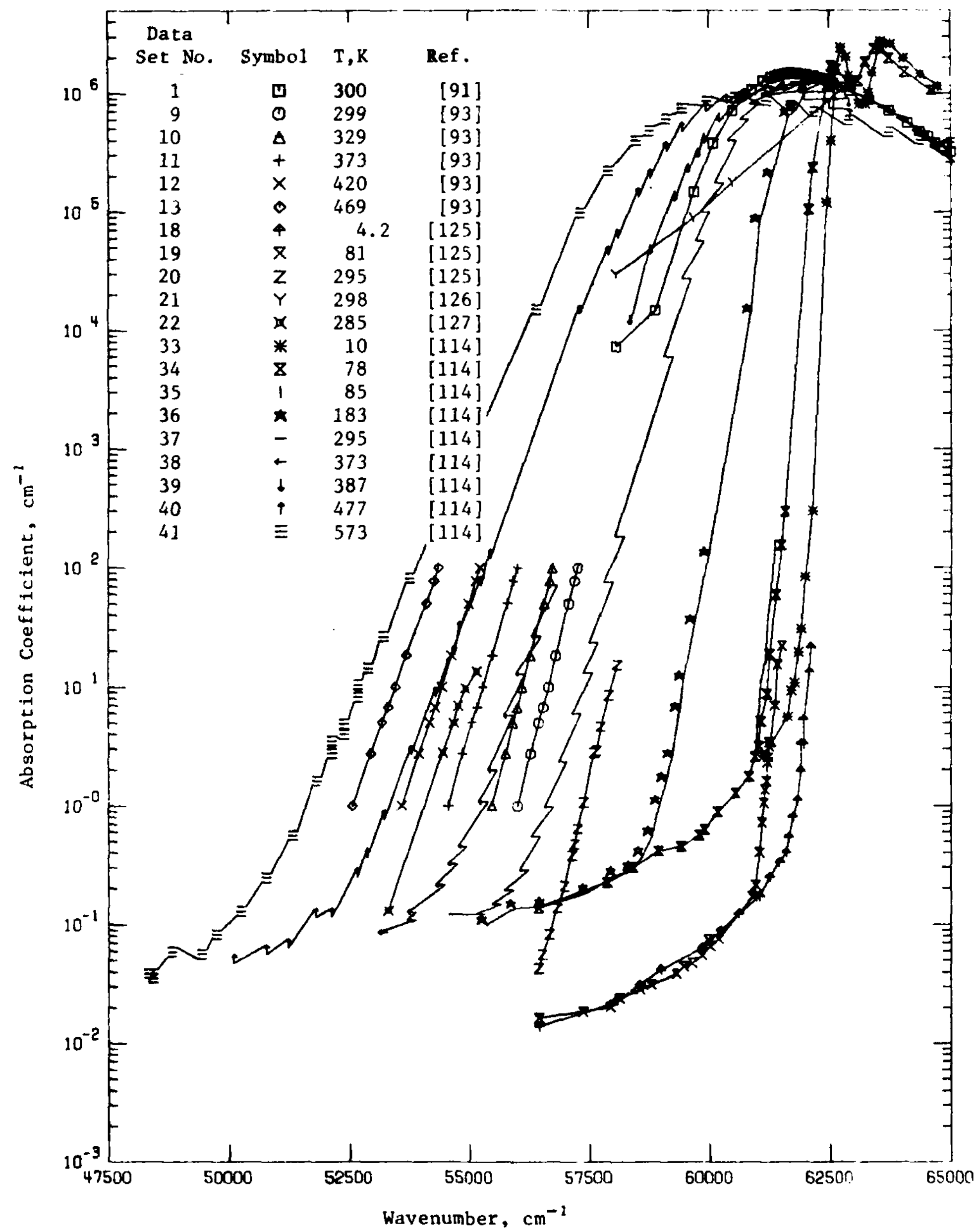

Figure 22. Absorption Coefficient of Potassium Chloride in the Urbach Tail Region

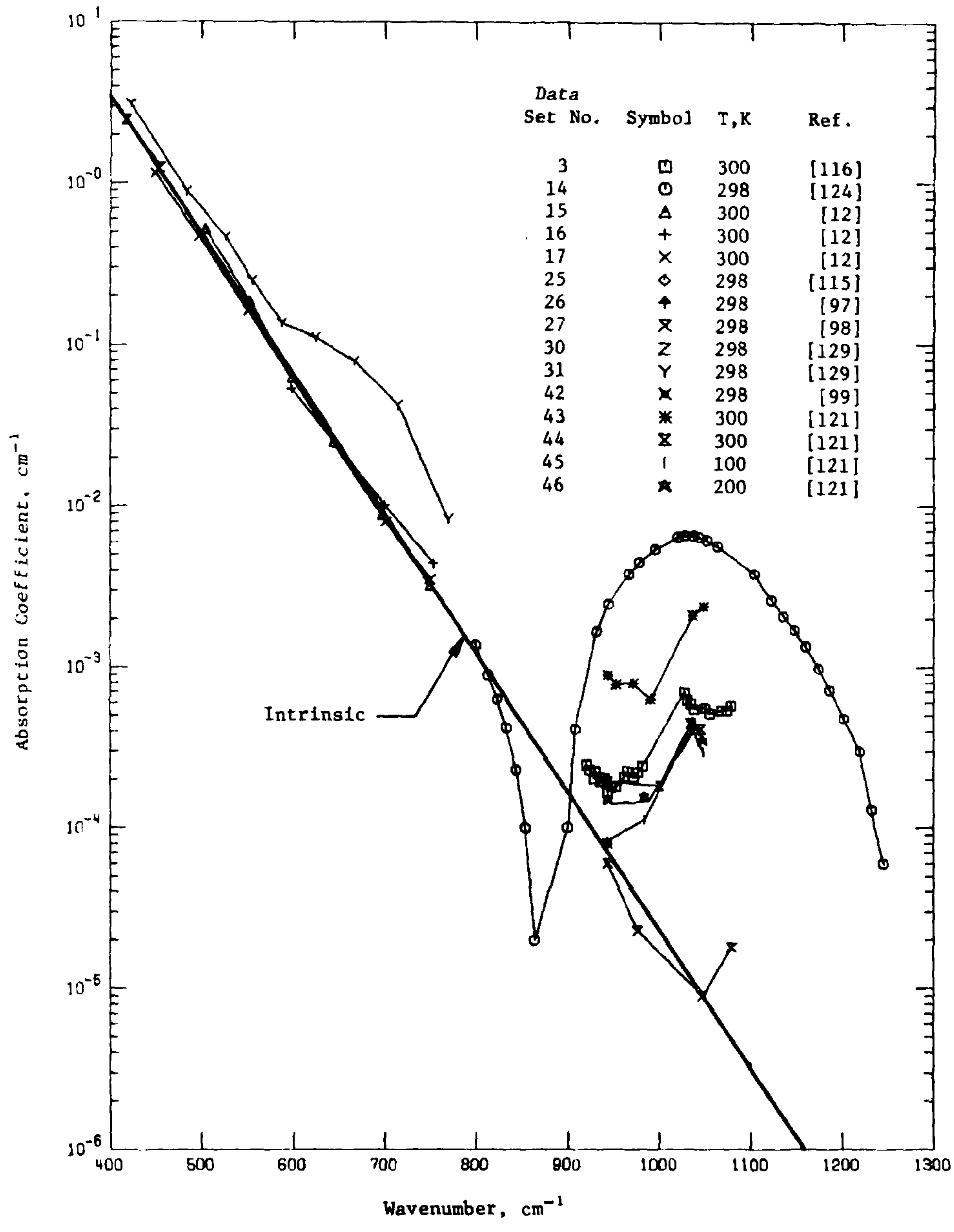

Figure 23. Absorption Coefficient of Potassium Chloride in the Multiphonon Region

TABLE 33. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE (Wavenumber Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	91	Koessler, D.M. and Walker, W.C.	1968	R	$5.80\times10^{4}-2.1\times10^{5}$	300	Single crystal; obtained from the Harshaw Chemical Co. or the Westinghouse Electric Corp.; absorption coefficients derived from a Kramer-Kronig analysis of the near normal reflection spectra; data extracted from a table.
2	122	Antinori, M., Balzarotti, A., and Piacentini, M.	1973	R	$1.04\times10^{5}-1.66\times10^{5}$	293	Single crystal; obtained from the Harshaw Chemical Co.; specimen cleaved in air just before being mounted in the sample chamber to be vacuum pumped; reflection spectrum obtained with a monochromator of band width 1.5 Å; spectra obtained on the same specimen after 24 hours did not show significant changes and reproduced with uncertainty of about 5%; absorption coefficients derived by means of the Kramers-Kronig analysis of the reflection spectrum obtained in this paper from 13.5 to 20.5 eV, below 13.5 eV reflectivity data of Tomiki utilized while those of Blechschmidt et al. used beyond 20.5 eV; data extracted from a figure.
3	116	Hass, M., Davisson, J.W., Klein, P.H., and Boyer, L.L.	1974	C	$9.2\times10^{2}-1.08\times10^{3}$	300	Single crystal; grown by the Bridgman method in a carbon tetrachloride atmosphere; window specimens chemically polished in concentrated HCl; absorption coefficients measured with a tunable CO_2 laser by calorimetric method; the total absorption coefficient (bulk absorption + surface absorption) data extracted from a figure; the appearance of a surface absorption band near 9.8 mm prevents observation of bulk absorption.
4	102	Cartwright, C.H. and Czerny, M.	1934	T	49-92	293	Crystal; thin plate specimen of 123 mm thick; absorption coefficients deduced from transmittance and thickness measurements; data extracted from a figure.
5	102	Cartwright, C.H. and Czerny, M.	1934	T	43-91	293	Similar to above except for a specimen of 163 mm thick.
6	102	Cartwright, C.H. and Czerny, M.	1934	T	42-94	293	Similar to above except for a specimen of 256 mm thick.
7	102	Cartwright, C.H. and Czerny, M.	1934	T	42-70	293	Similar to above except for a specimen of 347 mm thick.
8	103	Blechschmidt, D., Klucker, R., and Skibowski, M.	1969	R	$9.5\times10^{4}-2.5\times10^{5}$	293	Single crystal; provided by Karl Korth, Kiel, Germany; freshly cleaved specimen; absorption coefficients derived with the reflectivity versus angle of incidence method; data extracted from a figure.
9	93	Kobayashi, K. and Tomiki, T.	1961	T	$5.6\times10^{4}-5.73\times10^{4}$	299	Crystal; specially purified; containing traces of 9×10^{-7} in mole fraction, divalent metallic ion impurities of 1×10^{15} per cc and hydroxyl ions of 2×10^{15} per cc; transmittances at the absorption tail measured with a vacuum ultraviolet spectrophotometer; data extracted from a figure.
10	93	Kobayashi, K. and Tomiki, T.	1961	T	$5.5\times10^{4}-5.7\times10^{4}$	327	Same as above.

TABLE 33. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
11	93	Kobayashi, K. and Tomiki, T.	1961	T	$5.45x10^4$-$5.6x10^4$	373	Similar to above except at a higher temperature.
12	93	Kobayashi, K. and Tomiki, T.	1961	T	$5.35x10^4$-$5.53x10^4$	420	Similar to above except at a higher temperature.
13	93	Kobayashi, K. and Tomiki, T.	1961	T	$5.25x10^4$-$5.44x10^4$	469	Similar to above except at a higher temperature.
14	124	Deutsch, T.F.	1974	T	$8.0x10^2$-$1.25x10^3$	298	Single crystal; bar specimens of 6.4 cm long; absorption coefficients determined from transmission measurements; data extracted from a figure.
15	12	Deutsch, T.F.	1973	T	$5.0x10^2$-$7.5x10^2$	300	Single crystal; obtained from the Harshaw Chemical Co.; specimen of 2.54 cm diameter and 2.54 cm thick; absorption coefficients determined using a differential technique with a dual-beam spectrophotometer; data extracted from a figure.
16	12	Deutsch, T.F.	1973	T	$5.98x10^2$-$7.53x10^2$	300	Similar to above except for an Optovac single crystal.
17	12	Deutsch, T.F.	1973	T	$4.49x10^2$-$7.50x10^2$	300	Similar to above except for a Harshaw polycrystalline.
18	125	Tomiki, T.	1966	Z	$5.6x10^4$-$6.2x10^4$	4.2	Single crystal; obtained by a zone refining in chlorine atmosphere following vacuum distillation; cleaved specimens of 0.0175 cm to 0.497 cm thick; absorption coefficients deduced from reflectivity and transmission; data extracted from a figure.
19	125	Tomiki, T.	1966	Z	$5.6x10^4$-$6.2x10^4$	81	Similar to above except at a higher temperature.
20	125	Tomiki, T.	1966	Z	$5.6x10^4$-$5.8x10^4$	295	Similar to above except at a higher temperature.
21	126	Philipp, H.R. and Ehrenreich, H.	1963	R	$5.8x10^4$-$1.83x10^5$	298	Single crystal; obtained from the Harshaw Chemical Co.; absorption coefficients deduced from reflection spectrum; data extracted from a figure.
22	127	Kobayashi, K. and Tomiki, T.	1960	R	$5.3x10^4$-$5.52x10^4$	285	Single crystal; grown by vacuum distillation; cleaved specimens of 0.6-1.0 mm thick; absorption coefficients measured with a vacuum ultraviolet spectrophotometer; data extracted from a figure.
23	128	Johnson, K. and Bell, E.	1969	R	$5.69x10^2$-$2.86x10^2$	300	Single crystal; well polished single surface; reflectivity and phase simultaneously measured by asymmetric Fourier-transform spectroscopy and absorption coefficients deduced from the measurements; data extracted from a figure.
24	105	Ikezawa, M. and Nasu, K.	1973	R	$9.0x10^1$-$1.3x10^2$	1.8	Single crystal; grown from pure synthesized powders distilled in vacuum and zoned refined in a quartz tube in chlorine gas; cleaved; geometry not specified; data taken from a curve.

TABLE 33. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
25	115	Shrader, E.F.	1974	C	943.4	298	Pure crystal; polished disc specimens of 1 cm thick; absorption coefficient measured by calorimetric method; averaged value of the measurement 0.00089 cm^{-1}; absorption coefficients of doped KCl samples also measured with results of similar order of magnitude as that of pure crystal, temperature was not specified, 298 K discussed.
26	97	Hass, M., Davison, J.W., Rosenstock, H.B., and Babiskin, J.	1975	C	943.4	298	Single crystal; grown in reactive atmosphere; rectangular parallelepiped specimen of length 6.9 cm; all six sides chemically polished; laser calorimetric method used and the thermal rise curve obtained; bulk absorption coefficient determined based on the initial slope of the curve.
27	93	Allen, S.D. and Harrington, J.A.	1978	C	943.4-3571	296	Single crystal; grown by a reactive atmosphere process; rod specimen of 1 cm^2 x 13.97 cm; calorimetric method used; bulk absorption coefficient; data extracted from a figure.
28	119	Hass, M., Harrington, J.A., Gregory, D.A., and Davison, J.W.	1976	C	943.4,3571,2632	298	Single crystal; highly purified and polished rod specimens; measured with laser calorimetric techniques; data extracted from a table; origins of higher absorption at 2.7 μm and 3.8 μm due to impurities in bulk material and surface contamination.
29	118	Deutsch, T.F.	1975	C	1887	298	Single crystal; rod specimen; calorimetric method used; data extracted from a table.
30	129	Mentzel, A.	1934	T	222-455	298	Single crystals; thin film and plate specimens of thickness from 16 μm to 10 mm; absorption coefficients determined from transmission measurements; data extracted from a table.
31	129	Mentzel, A.	1934	Z	422-769	298	Single crystals; plate specimens of 10.7 μm to 1 cm; transmission measured by Ruben and Trowbridge [175] in 1897; incorporated with reflectivity obtained in this reference, the absorption coefficient determined; data extracted from a table.
32	23	Genzel, L., Happ, H., and Weber, R.	1959	T	3.1-33	298	Crystal; plate specimens of 2.5, 5.0, and 35.0 μm thick; transmission measured and absorption coefficient determined; data extracted from a figure.
33	114	Tomiki, T.	1967	Z	$6.1x10^4$-$6.8x10^4$	10	Single crystals; zone refined in the atmosphere of chlorine after the process of the vacuum distillation from the starting powder; specimens with cleaved surfaces; absorption coefficients determined from reflectivity and transmission measurements; data extracted from a figure.
34	114	Tomiki, T.	1967	Z	$5.6x10^4$-$6.7x10^4$	78	Same as above.
35	114	Tomiki, T.	1967	Z	$5.6x10^4$-$6.2x10^4$	85	Same as above.

TABLE 33. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
36	114	Tomiki, T.	1967	Z	$5.5x10^{4}$-$6.2x10^{4}$	183	Same as above.
37	114	Tomiki, T.	1967	Z	$5.4x10^{4}$-$6.8x10^{4}$	295	Same as above.
38	114	Tomiki, T.	1967	Z	$5.3x10^{4}$-$5.7x10^{4}$	373	Same as above.
39	114	Tomiki, T.	1967	Z	$5.8x10^{4}$-$6.3x10^{4}$	387	Same as above.
40	114	Tomiki, T.	1967	Z	$5.0x10^{4}$-$6.3x10^{4}$	477	Same as above.
41	114	Tomiki, T.	1967	Z	$4.8x10^{4}$-$6.8x10^{4}$	573	Same as above.
42	59	Rosenstock, H.B., Gregory, D.A., and Harrington, J.A.	1976	C	943.4	298	Single crystals; obtained from the Naval Research Lab., the Harshaw Chemical Co., and the Raytheon Corp.; mechanically polished and chemically cleaned with spectrograde CCl_4; laser calorimetric method used; data taken from a table; it was found that the surface absorption was about 45 times higher than the bulk absorption.
43	121	Rowe, J.M. and Harrington, J.A.	1976	C	943.4-1048	300	Single crystal; grown by the early reactive-atmosphere-process; chemically etched surfaces; total absorption coefficient determined with laser calorimetric method; higher absorption near 9.6 μm due to extrinsic sources; data taken from a figure.
44	121	Rowe, J.M. and Harrington, J.A.	1976	C	943.4-1048	300	Similar to above except for samples grown by improved reactive-atmosphere-process and absorption near 9.6 μm decreased.
45	121	Rowe, J.M. and Harrington, J.A.	1976	C	943.4-1048	100	Same as above.
46	121	Rowe, J.M. and Harrington, J.A.	1976	C	943.4-1048	200	Same as above.

TABLE 34. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE (Wavenumber Dependence)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

ν	α	ν	α	ν	α	ν	α	ν	α	ν	α
DATA SET 1		DATA SET 1(CONT.)		DATA SET 1(CONT.)		DATA SET 1(CONT.)		DATA SET 1(CONT.)		DATA SET 2(CONT.)	
T = 3[illegible]											
		1.623E+5	6.902E+5	1.024E+5	1.467E+6	7.653E+4	1.337E+6	6.210E+4	1.397E+6	1.540E+5	9.430E+5
2.097E+5	2.035E+5	1.625E+5	7.904E+5	1.020E+5	1.513E+6	7.645E+4	1.355E+6	6.202E+4	1.426E+6	1.532E+5	9.250E+5
2.089E+5	3.150E+5	1.621E+5	9.180E+5	1.016E+5	1.532E+6	7.613E+4	1.397E+6	6.194E+4	1.449E+6	1.522E+5	9.290E+5
2.081E+5	3.660E+5	1.617E+5	9.956E+5	1.012E+5	1.526E+6	7.581E+4	1.460E+6	6.185E+4	1.461E+6	1.510E+5	8.220E+5
2.056E+5	4.052E+5	1.613E+5	1.054E+6	1.000E+5	1.467E+6	7.540E+4	1.364E+6	6.177E+4	1.450E+6	1.493E+5	7.440E+5
2.016E+5	5.374E+5	1.609E+5	1.092E+6	9.919E+4	1.271E+6	7.500E+4	1.282E+6	6.169E+4	1.489E+6	1.483E+5	6.770E+5
1.960E+5	5.910E+5	1.605E+5	1.139E+6	9.077E+4	1.069E+6	7.419E+4	1.054E+6	6.161E+4	1.471E+6	1.474E+5	6.516E+5
1.952E+5	6.131E+5	1.597E+5	1.144E+6	9.355E+4	7.641E+5	7.255E+4	6.332E+5	6.153E+4	1.454E+6	1.464E+5	6.3[illegible]E+5
1.944E+5	6.115E+5	1.581E+5	1.132E+6	9.194E+4	6.932E+5	7.177E+4	5.953E+5	6.145E+4	1.429E+6	1.450E+5	6.13[illegible]E+5
1.935E+5	[illegible]	1.565E+5	1.14[illegible]E+6	9.112E+4	6.413E+5	7.016E+4	4.761E+5	6.137E+4	1.383E+6	[illegible]	[illegible]
1.927E+5	6.355E+5	1.549E+5	1.113E+6	9.032E+4	6.016E+5	6.935E+4	4.445E+5	6.129E+4	1.356E+6	1.427E+5	6.37[illegible]E+5
1.927E+5	6.655E+5	1.432E+5	8.052E+5	8.952E+4	5.849E+5	6.895E+4	4.419E+5	6.113E+4	1.267E+6	1.417E+5	6.592E+5
1.857E+5	6.877E+5	1.400E+5	6.371E+5	8.911E+4	5.599E+5	6.855E+4	4.393E+5	6.089E+4	1.079E+6	1.403E+5	6.805E+5
1.871E+5	7.249E+5	1.452E+5	6.749E+5	8.871E+4	5.239E+5	6.815E+4	4.453E+5	6.048E+4	7.145E+5	1.405E+5	6.803E+5
1.863E+5	7.491E+5	1.444E+5	6.712E+5	8.790E+4	4.529E+5	6.790E+4	4.437E+5	6.008E+4	3.775E+5	1.395E+5	6.803E+5
1.855E+5	7.715E+5	1.411E+5	6.917E+5	8.710E+4	4.487E+5	6.774E+4	4.341E+5	5.968E+4	1.500E+5	1.389E+5	6.52[illegible]E+5
[illegible]	7.325E+5	1.395E+5	7.013E+5	8.54[illegible]E+4	4.297E+5	6.758E+4	4.161E+5	5.887E+4	1.480E+4	1.371E+5	[illegible]
1.847E+5	[illegible]	1.387E+5	6.972E+5	8.408E+4	4.363E+5	6.734E+4	3.893E+5	5.806E+4	7.297E+3	1.354E+5	5.44[illegible]E+5
1.793E+5	7.594E+5	1.379E+5	6.932E+5	8.387E+4	4.532E+5	6.694E+4	3.365E+5			1.337E+5	4.93[illegible]E+5
1.782E+5	7.467E+5	1.371E+5	6.891E+5	8.347E+4	4.510E+5	6.613E+4	2.742E+5	DATA SET 2		[illegible]	[illegible]
1.774E+5	7.134E+5	1.347E+5	5.323E+5	8.306E+4	4.175E+5	6.573E+4	2.726E+5	T = 293.0		[illegible]	[illegible]
1.766E+5	[illegible]	1.319E+5	4.295E+5	8.226E+4	4.031E+5	6.532E+4	2.791E+5			1.285E+5	[illegible]
1.758E+5	6.623E+5	1.300E+5	4.269E+5	8.145E+4	3.889E+5	6.516E+4	2.948E+5	1.654E+5	7.270E+5	1.271E+5	[illegible]
1.750E+5	6.597E+5	1.291E+5	4.379E+5	8.065E+4	3.750E+5	6.508E+4	3.026E+5	1.648E+5	7.510E+5	1.244E+5	4.52[illegible]E+5
1.734E+5	[illegible]	1.242E+5	4.526E+5	8.024E+4	3.630E+5	6.500E+4	3.186E+5	1.643E+5	7.840E+5	[illegible]	[illegible]
1.726E+5	8.075E+5	[illegible]	4.744E+5	8.000E+4	3.720E+5	6.484E+4	3.504E+5	1.639E+5	8.360E+5	1.215E+5	[illegible]
[illegible]	9.329E+5	1.194E+5	5.399E+5	7.968E+4	3.905E+5	6.468E+4	3.820E+5	1.635E+5	9.220E+5	1.199E+5	5.61[illegible]E+5
1.714E+5	[illegible]	1.163E+5	5.878E+5	7.935E+4	4.138E+5	6.452E+4	4.378E+5	1.631E+5	1.010E+6	[illegible]	[illegible]
1.710E+5	1.127E+6	1.137E+5	[illegible]	7.903E+4	4.569E+5	6.435E+4	4.771E+5	1.624E+5	1.195E+6	1.177E+5	6.150E+5
[illegible]	[illegible]	1.121E+5	[illegible]	7.863E+4	5.731E+5	6.411E+4	5.640E+5	1.622E+5	1.190E+6	[illegible]	[illegible]
1.702E+5	1.197E+6	1.105E+5	8.191E+5	7.823E+4	7.176E+5	6.371E+4	7.265E+5	1.620E+5	1.164E+6	[illegible]	[illegible]
1.694E+5	[illegible]	1.081E+5	9.234E+5	7.77[illegible]E+4	9.085E+5	6.331E+4	8.336E+5	1.618E+5	1.152E+6	1.143E+5	[illegible]
1.685E+5	[illegible]	1.065E+5	[illegible]	7.742E+4	1.041E+6	6.290E+4	1.043E+6	1.615E+5	1.182E+6	1.137E+5	7.31[illegible]E+5
1.669E+5	[illegible]	1.050E+5	1.049E+6	7.726E+4	1.107E+6	6.274E+4	1.127E+6	1.613E+5	1.191E+6	[illegible]	7.82[illegible]E+5
1.661E+5	[illegible]	1.043E+5	1.123E+6	7.710E+4	1.163E+6	6.258E+4	1.211E+6	1.603E+5	1.124E+6	1.123E+5	8.430E+5
1.657E+5	6.372E+5	1.044E+5	1.181E+6	7.694E+4	1.218E+6	6.250E+4	1.249E+6	1.594E+5	1.016E+6	1.117E+5	8.920E+5
1.653E+5	6.643E+5	1.043E+5	1.242E+6	7.685E+4	1.246E+6	6.242E+4	1.294E+6	1.587E+5	9.930E+5	1.109E+5	[illegible]
1.649E+5	6.425E+5	1.036E+5	1.302E+6	7.677E+4	1.274E+6	6.234E+4	1.332E+6	1.573E+5	1.002E+5	[illegible]	[illegible]
1.645E+5	6.522E+5	1.032E+5	1.362E+6	7.669E+4	1.301E+6	6.226E+4	1.361E+6	1.569E+5	1.074E+5	1.096E+5	[illegible]
1.637E+5	6.533E+5	1.028E+5	1.421E+6	7.661E+4	1.319E+6	6.218E+4	1.399E+6	1.561E+5	1.062E+5	1.073E+5	1.050E+6

TABLE 34. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE (Wavenumber Dependence) (continued)

ν	α
DATA SET 2(CONT.)	
1.172E+5	1.173E+6
1.166E+5	1.111E+6
1.161E+5	1.154E+6
1.157E+5	1.231E+6
1.152E+5	1.261E+6
1.145E+5	1.4[illegible]E+6
DATA SET 3	
T = 3[illegible].0	
1.078E+3	5.750E-4
1.074E+3	5.370E-4
1.066E+3	5.370E-4
1.055E+3	5.170E-4
1.050E+3	5.510E-4
1.039E+3	5.490E-4
1.034E+3	5.910E-4
1.031E+3	6.230E-4
1.027E+3	7.110E-4
9.914E+2	2.430E-4
9.760E+2	2.220E-4
9.7[illegible]E+2	2.070E-4
9.653E+2	2.250E-4
9.615E+2	2.070E-4
9.524E+2	1.790E-4
9.479E+2	1.910E-4
9.434E+2	1.090E-4
9.398E+2	2.050E-4
9.355E+2	1.990E-4
9.3[illegible]E+2	2.250E-4
9.285E+2	2.020E-4
9.24[illegible]E+2	2.290E-4
9.2[illegible]8E+2	2.400E-4
DATA SET 4	
T = 293.0	
9.209E+1	7.037E+1
8.340E+1	6.949E+1
7.782E+1	6.191E+1

ν	α
DATA SET 4(CONT.)	
6.969E+1	5.797E+1
5.311E+1	3.519E+1
4.920E+1	2.891E+1
DATA SET 5	
T = 293.0	
9.192E+1	7.574E+1
8.054E+1	6.979E+1
7.174E+1	6.031E+1
6.472E+1	5.384E+1
5.924E+1	4.541E+1
5.420E+1	3.467E+1
5.025E+1	2.842E+1
4.307E+1	2.173E+1
DATA SET 6	
T = 293.0	
9.372E+1	7.879E+1
8.054E+1	6.074E+1
7.205E+1	5.813E+1
6.472E+1	5.124E+1
5.924E+1	4.161E+1
5.422E+1	3.324E+1
4.974E+1	2.646E+1
4.604E+1	2.472E+1
4.223E+1	2.030E+1
DATA SET 7	
T = 293.0	
7.215E+1	5.547E+1
6.491E+1	4.895E+1
5.917E+1	3.971E+1
5.322E+1	3.177E+1
5.122E+1	2.987E+1
4.577E+1	2.023E+1
4.198E+1	2.226E+1

ν	α
DATA SET 8	
T = 293.0	
2.485E+5	7.587E+5
2.420E+5	7.938E+5
2.379E+5	8.759E+5
2.350E+5	9.553E+5
2.308E+5	1.045E+6
2.283E+5	1.073E+6
2.258E+5	1.010E+6
2.237E+5	8.627E+5
2.221E+5	8.345E+5
2.191E+5	8.646E+5
2.142E+5	1.001E+6
2.073E+5	1.170E+6
2.047E+5	1.159E+6
2.027E+5	1.093E+6
1.973E+5	1.012E+6
1.966E+5	9.689E+5
1.919E+5	9.451E+5
1.882E+5	9.650E+5
1.861E+5	1.020E+6
1.840E+5	1.045E+6
1.822E+5	1.030E+6
1.790E+5	9.909E+5
1.781E+5	9.514E+5
1.745E+5	9.157E+5
1.750E+5	9.368E+5
1.731E+5	1.232E+6
1.711E+5	1.349E+6
1.677E+5	9.334E+5
1.645E+5	7.463E+5
1.623E+5	1.117E+6
1.608E+5	1.199E+6
1.584E+5	1.107E+6
1.551E+5	1.084E+6
1.524E+5	9.979E+5
1.492E+5	8.460E+5
1.463E+5	7.392E+5
1.440E+5	7.276E+5
1.416E+5	7.456E+5
1.394E+5	7.793E+5

ν	α
DATA SET 8(CONT.)	
1.345E+5	6.214E+5
1.309E+5	5.197E+5
1.294E+5	4.893E+5
1.255E+5	4.759E+5
1.225E+5	4.516E+5
1.193E+5	5.169E+5
1.178E+5	5.760E+5
1.139E+5	6.683E+5
1.130E+5	7.906E+5
1.051E+5	1.056E+6
1.034E+5	1.447E+6
1.021E+5	1.540E+6
9.831E+4	1.174E+6
9.712E+4	1.068E+6
9.577E+4	9.751E+5
DATA SET 9	
T = 299.0	
5.727E+4	1.000E+2
5.720E+4	7.780E+1
5.707E+4	5.012E+1
5.680E+4	1.828E+1
5.665E+4	1.000E+1
5.653E+4	6.745E+0
5.645E+4	5.012E+0
5.627E+4	2.754E+0
5.600E+4	1.000E+0
DATA SET 10	
T = 329.0	
5.674E+4	1.000E+2
5.659E+4	7.780E+1
5.656E+4	5.012E+1
5.627E+4	1.828E+1
5.610E+4	1.000E+1
5.600E+4	6.745E+0
5.591E+4	5.012E+0
5.575E+4	2.754E+0

ν	α
DATA SET 10(CONT.)	
5.546E+4	1.000E+0
DATA SET 11	
T = 373.0	
5.602E+4	1.000E+2
5.593E+4	7.780E+1
5.580E+4	5.012E+1
5.548E+4	1.828E+1
5.529E+4	1.000E+1
5.516E+4	6.745E+0
5.506E+4	5.012E+0
5.485E+4	2.754E+0
5.455E+4	1.000E+0
DATA SET 12	
T = 420.0	
5.524E+4	1.000E+2
5.515E+4	7.780E+1
5.499E+4	5.012E+1
5.463E+4	1.828E+1
5.443E+4	1.000E+1
5.429E+4	6.745E+0
5.418E+4	5.012E+0
5.394E+4	2.754E+0
5.359E+4	1.000E+0
DATA SET 13	
T = 469.0	
5.437E+4	1.000E+2
5.428E+4	7.780E+1
5.411E+4	5.012E+1
5.369E+4	1.828E+1
5.347E+4	1.000E+1
5.331E+4	6.745E+0
5.319E+4	5.012E+0
5.294E+4	2.754E+0
5.256E+4	1.000E+0

ν	α
DATA SET 14	
T = 295.0	
1.245E+3	6.300E-5
1.232E+3	1.300E-4
1.219E+3	3.300E-4
1.202E+3	4.800E-4
1.190E+3	7.2[illegible]E-4
1.174E+3	9.9[illegible]E-4
1.160E+3	1.34[illegible]E-3
1.147E+3	1.710E-3
1.135E+3	2.07[illegible]E-3
1.122E+3	2.620E-3
1.103E+3	3.600E-3
1.063E+3	5.00[illegible]E-3
1.05[illegible]E+3	6.1[illegible]E-3
1.043E+3	6.420E-3
1.037E+3	6.54[illegible]E-3
1.024E+3	6.54[illegible]E-3
1.022E+3	6.33[illegible]E-3
9.953E+2	5.380E-3
9.780E+2	4.500E-3
9.660E+2	3.73[illegible]E-3
9.440E+2	2.470E-3
9.3[illegible]E+2	1.660E-3
9.[illegible]E+2	4.1[illegible]E-4
9.100E+2	1.3[illegible]E-4
8.640E+2	2.050E-5
8.540E+2	1.0[illegible]E-4
8.440E+2	7.3[illegible]E-4
8.330E+2	4.200E-4
8.230E+2	6.3[illegible]E-4
8.130E+2	8.9[illegible]E-4
8.000E+2	1.370E-3
DATA SET 15	
T = 3[illegible].0	
7.562E+2	3.220E-3
6.969E+2	8.9[illegible]E-3
6.439E+2	1.49[illegible]E-2
5.992E+2	6.220E-2

TABLE 34. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE (Wavenumber Dependence) (continued)

ν	α
DATA SET 15(CONT.)	
5.532E+2	1.845E-1
5.640E+2	5.152E-1
DATA SET 16	
T = 3[illegible]	
7.51[illegible]E+2	4.4[illegible]E-3
6.993E+2	1.01[illegible]E-2
5.301E+2	5.322E-2
DATA SET 17	
T = 3[illegible]	
7.5[illegible]E+2	3.5[illegible]E-3
7.[illegible]E+2	5.[illegible]E-3
5.9[illegible]E+2	1.01[illegible]E-1
4.37[illegible]E+2	4.077E-1
4.495E+2	1.153E+0
DATA SET 18	
T = 4.2	
6.21[illegible]E+4	2.193E+1
6.207E+4	1.337E+1
6.[illegible]95E+4	5.321E+0
6.135E+4	3.311E+0
6.149E+4	3.327E+0
6.1[illegible]E+4	1.[illegible]E+0
6.1[illegible]E+4	1.122E+0
6.173E+4	5.[illegible]E-1
6.104E+4	5.44[illegible]E-1
6.159E+4	4.[illegible]7[illegible]E-1
6.145E+4	3.573E-1
6.125E+4	2.[illegible]E-1
6.1[illegible]4[illegible]E+4	1.73[illegible]E-1
6.[illegible]E+4	1.2[illegible]2E-1
6.[illegible]23E+4	5.35[illegible]E-2
5.904E+4	6.3[illegible]6E-2
5.899E+4	4.2[illegible]7E-2
5.594E+4	3.4[illegible]E-2

ν	α
DATA SET 18(CONT.)	
5.4[illegible]7E+4	2.323E-2
5.794E+4	2.128E-2
5.645E+4	1.4[illegible]E-2
DATA SET 19	
T = [illegible]	
6.15[illegible]E+4	2.268E+1
6.141E+4	1.549E+1
6.[illegible]35E+4	6.982E+0
6.127E+4	3.451E+0
6.[illegible]E+4	3.[illegible]E+0
6.[illegible]23[illegible]E+4	3.[illegible]E+0
6.12[illegible]E+4	2.57[illegible]E+0
6.12[illegible]E+4	2.325E+0
6.114E+4	1.01[illegible]E+0
6.[illegible]15E+4	1.351E+0
6.[illegible]12E+4	1.[illegible]E+0
6.1[illegible]E+4	7.24[illegible]E-1
6.1[illegible]3E+4	4.[illegible]5E-1
6.[illegible]E+4	2.1[illegible]3E-1
6.[illegible]E+4	1.722E-1
6.[illegible]E+4	7.621E-2
6.[illegible]2E+4	6.577E-2
5.937E+4	7.447E-2
5.953E+4	5.5[illegible]E-2
5.904E+4	4.74[illegible]E-2
5.[illegible]E+4	4.[illegible]7E-2
5.931E+4	3.359E-2
5.873E+4	3.[illegible]E-2
5.855E+4	2.858E-2
5.812E+4	2.338E-2
5.793E+4	2.[illegible]23E-2
5.757E+4	1.454E-2
5.645E+4	1.[illegible]4E-2
DATA SET 20	
T = 295.0	
5.849E+4	1.528E+1

ν	α
DATA SET 20(CONT.)	
5.790E+4	8.511E+0
5.775E+4	4.656E+0
5.765E+4	2.924E+0
5.76[illegible]E+4	2.793E+0
5.738E+4	1.[illegible]70[illegible]E+0
5.726E+4	5.457E-1
5.71[illegible]E+4	4.76[illegible]E-1
5.713E+4	3.819E-1
5.693E+4	2.099E-1
5.632E+4	1.380E-1
5.667E+4	8.356E-2
5.651E+4	5.593E-2
5.645E+4	4.285E-2
DATA SET 21	
T = 299.0	
1.831E+5	1.220E+6
1.732E+5	1.020E+6
1.774E+5	9.710E+5
1.75[illegible]E+5	9.410E+5
1.726E+5	1.[illegible]E+6
1.718E+5	1.340E+6
1.7[illegible]2E+5	1.420E+6
1.695E+5	1.350E+6
1.637E+5	9.[illegible]E+5
1.621E+5	8.2[illegible]E+5
1.6[illegible]5E+5	8.9[illegible]E+5
1.5[illegible]E+5	1.410E+6
1.408E+5	7.6[illegible]E+5
1.452E+5	6.7[illegible]E+5
1.4[illegible]3E+5	7.260E+5
1.363E+5	7.2[illegible]E+5
1.347E+5	6.[illegible]E+5
1.315E+5	5.3[illegible]E+5
1.266E+5	4.50[illegible]E+5
1.2[illegible]E+5	5.4[illegible]E+5
1.153E+5	7.50[illegible]E+5
1.121E+5	9.5[illegible]E+5
1.081E+5	1.[illegible]40E+6

ν	α
DATA SET 21(CONT.)	
1.032E+5	1.596E+6
9.839E+4	9.80[illegible]E+5
9.516E+4	7.2[illegible]E+5
9.113E+4	5.1[illegible]E+5
8.629E+4	4.10[illegible]E+5
8.387E+4	4.4[illegible]E+5
8.145E+4	4.1[illegible]E+5
7.934E+4	5.200E+5
7.742E+4	1.390E+6
7.177E+4	5.[illegible]E+5
7.097E+4	3.9[illegible]E+5
6.[illegible]E+4	3.4[illegible]E+5
6.694E+4	2.700E+5
6.532E+4	5.1[illegible]E+5
6.29[illegible]E+4	1.23[illegible]E+6
6.048E+4	1.9[illegible]E+5
5.968E+4	9.0[illegible]E+4
5.9[illegible]6E+4	3.[illegible]E+4
DATA SET 22	
T = 285.0	
5.516E+4	1.342E+1
5.432E+4	9.700E+0
5.476E+4	6.910E+0
5.468E+4	4.958E+0
5.444E+4	2.826E+0
5.331E+4	1.310E-1
DATA SET 23	
T = 300.0	
2.856E+2	1.[illegible]81E-2
2.[illegible]3E+2	2.139E-2
2.734E+2	2.41[illegible]E-2
2.733E+2	2.594E-2
2.[illegible]7[illegible]E+2	2.[illegible]5E-2
2.407E+2	1.426E-1
2.384E+2	1.578E-1
2.356E+2	1.637E-1

ν	α
DATA SET 23(CONT.)	
2.309E+2	1.667E-1
2.263E+2	1.811E-1
2.227E+2	2.061E-1
2.151E+2	5.22[illegible]E-1
2.140E+2	5.5[illegible]E-1
2.11[illegible]E+2	5.5[illegible]E-1
2.1[illegible]E+2	5.37[illegible]E-1
2.074E+2	5.105E-1
2.053E+2	5.105E-1
2.015E+2	5.152E-1
1.987E+2	5.297E-1
1.932E+2	6.577E-1
1.891E+2	7.834E-1
1.[illegible]53E+2	[illegible]71[illegible]E-1
1.731E+2	1.259E+0
1.626E+2	1.91[illegible]E+0
1.553E+2	2.70[illegible]E+0
1.491E+2	3.926E+0
1.454E+2	5.346E+0
1.422E+2	5.754E+0
1.395E+2	2.642E+0
1.313E+2	3.963E-1
1.272E+2	2.615E-1
1.215E+2	2.023E-1
1.146E+2	1.629E-1
1.074E+2	1.36[illegible]E-1
9.540E+1	1.112E-1
9.612E+1	9.95[illegible]E-2
9.373E+1	6.932E-2
9.19[illegible]E+1	6.457E-2
9.040E+1	6.516E-2
8.840E+1	6.859E-2
8.66[illegible]E+1	8.054E-2
8.552E+1	9.247E-2
8.360E+1	1.023E-1
7.960E+1	1.127E-1
7.590E+1	1.1[illegible]E-1
7.340E+1	1.052E-1
7.110E+1	9.727E-2
5.830E+1	4.446E-2

ν	α
DATA SET 24	
T = 1.9	
1.30[illegible]E+2	3.631E+3
1.279E+2	2.511E+3
1.275E+2	2.632E+3
1.26[illegible]E+2	2.3[illegible]E+[illegible]
1.253E+2	1.952E+0
1.255E+2	1.85[illegible]E+3
1.253E+2	1.82[illegible]E+[illegible]
1.243E+2	1.923E+3
1.241E+2	1.756E+0
1.239E+2	1.736E+3
1.2[illegible]E+2	1.052E+[illegible]
1.212E+2	1.0[illegible]E+3
1.2[illegible]E+2	[illegible]54[illegible]E+[illegible]
1.194E+2	1.47[illegible]E+3
1.189E+2	1.179E+0
1.19[illegible]E+2	1.5[illegible]7E+[illegible]
1.1[illegible]E+2	1.54[illegible]E+0
1.174E+2	1.774E+3
1.171E+2	1.991E+0
1.1[illegible]E+2	2.076E+0
1.1[illegible]7[illegible]E+2	[illegible]991E+3
1.[illegible]6[illegible]E+2	1.334E+0
1.[illegible]5[illegible]E+2	9.376E-1
1.147E[illegible]	8.433E-1
1.13[illegible]E+2	6.714E-1
1.123E+2	5.340E-1
1.[illegible]1[illegible]E+2	4.54[illegible]E-1
1.112E+2	4.677E-1
1.11[illegible]E+2	4.236E-1
1.1[illegible]1[illegible]E+2	4.13[illegible]E-1
1.096E+2	4.13[illegible]E-1
1.093E+2	4.270E-1
1.092E+2	5.24[illegible]E-1
1.073E+2	5.333E-1
1.072E+2	5.1[illegible]E-1
1.074E+2	5.062E-1
1.0[illegible]0[illegible]E+2	4.457E-1
1.059E+2	4.335E-1
1.043E+2	4.235E-1

TABLE 34. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE (Wavenumber Dependence) (continued)

ν	α
DATA SET 24 (CONT.)	
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
9.95[illegible]E+1	2.33[illegible]E-1
9.9[illegible]E+1	2.9[illegible]E-1
9.84[illegible]E+1	[illegible]
9.9[illegible]E+1	2.9[illegible]E-1
[illegible]	[illegible]
DATA SET 25	
T = 296.0	
9.[illegible]E+2	6.9[illegible]E-4
DATA SET 26	
T = 293.0	
[illegible]	[illegible]
DATA SET 27	
T = 293.0	
3.572E+3	[illegible]
2.652E+3	[illegible]
1.657E+3	[illegible]E-7
[illegible]	1.5[illegible]E-5
[illegible]	[illegible]
9.756E+2	3.3[illegible]E-5
[illegible]	[illegible]
DATA SET 28	
T = 293.0	
[illegible]	7.[illegible]E-6
3.74[illegible]E+3	3.7[illegible]E-4
2.632E+3	[illegible]E-4

ν	α
DATA SET 29	
T = 296.0	
1.337E+3	1.5[illegible]E-5
DATA SET 30	
T = 293.0	
4.9[illegible]E+2	1.257E+0
4.[illegible]E+2	[illegible]
3.5[illegible]E+2	4.3[illegible]E+0
3.57[illegible]E+2	6.73[illegible]E+0
3.32[illegible]E+2	1.257E+1
3.125E+2	2.[illegible]3E+1
2.9[illegible]E+2	3.[illegible]E+1
2.773E+2	6.981E+1
2.632E+2	1.224E+2
2.5[illegible]E+2	2.325E+2
2.[illegible]E+2	3.[illegible]E+2
2.273E+2	[illegible]E+2
2.222E+2	9.930E+2
DATA SET 31	
T = 294.0	
7.032E+2	8.205E-3
7.[illegible]E+2	4.[illegible]E-2
6.[illegible]7E+2	7.358E-2
5.25[illegible]E+2	[illegible]E-1
5.[illegible]2E+2	1.36[illegible]E-1
5.5[illegible]E+2	[illegible]E-1
[illegible]	[illegible]E-1
4.[illegible]E+2	6.9[illegible]E-1
4.[illegible]E+2	3.[illegible]E+0
DATA SET 32	
T = 290.0	
[illegible]	1.373E+1
2.0[illegible]E+1	9.252E+0
2.[illegible]E+1	7.440E+0
2.[illegible]E+1	5.317E+0

ν	α
DATA SET 32 (CONT.)	
2.012E+1	4.[illegible]E+0
1.82[illegible]E+1	3.691E+0
1.601E+1	3.152E+0
1.546E+1	2.758E+0
1.437E+1	2.419E+0
1.337E+1	2.[illegible]E+0
1.255E+1	1.9[illegible]E+0
1.17[illegible]E+1	1.[illegible]E+0
1.[illegible]E+1	1.293E+0
1.[illegible]E+1	1.[illegible]E+0
9.615E+0	1.032E+0
8.929E+0	8.9[illegible]7E-1
8.621E+0	7.562E-1
7.8[illegible]E+0	6.853E-1
8.403E+0	6.727E-1
7.2[illegible]E+0	5.537E-1
7.1[illegible]E+0	4.892E-1
6.329E+0	3.81[illegible]E-1
5.507E+0	3.068E-1
5.65[illegible]E+0	2.882E-1
4.635E+0	1.870E-1
3.953E+0	1.390E-1
3.953E+0	1.286E-1
3.125E+0	6.715E-2
DATA SET 33	
T = 10.0	
6.8[illegible]E+4	3.[illegible]E+5
6.7[illegible]E+4	2.[illegible]E+5
6.777E+4	1.093E+5
6.755E+4	1.[illegible]E+5
6.727E+4	9.5[illegible]E+4
6.695E+4	5.5[illegible]E+4
6.[illegible]5E+4	1.5[illegible]E+5
6.[illegible]9E+4	2.218E+5
6.5[illegible]E+4	3.715E+5
6.5[illegible]E+4	5.[illegible]E+5
6.536E+4	6.664E+5
6.5[illegible]E+4	9.162E+5

ν	α
DATA SET 33 (CONT.)	
6.473E+4	1.153E+6
6.437E+4	1.458E+6
6.402E+4	1.[illegible]7E+6
6.375E+4	2.[illegible]9E+6
6.355E+4	2.754E+6
6.33[illegible]E+4	1.[illegible]E+6
6.329E+4	1.[illegible]9E+6
6.32[illegible]E+4	6.[illegible]E+5
6.3[illegible]E+4	8.[illegible]E+5
6.23[illegible]E+4	1.[illegible]E+6
6.28[illegible]E+4	2.123E+6
6.273E+4	2.422E+6
6.2[illegible]E+4	1.577E+6
6.252E+4	3.3[illegible]E+5
6.24[illegible]E+4	1.2[illegible]E+5
6.213E+4	3.[illegible]E+2
6.190E+4	8.433E+1
6.191E+4	3.[illegible]E+1
6.184E+4	1.907E+1
6.177E+4	1.088E+1
6.169E+4	9.375E+0
6.152E+4	5.023E+0
6.111E+4	2.6[illegible]E+0
DATA SET 34	
T = 79.0	
6.739E+4	7.620E+4
6.713E+4	4.487E+4
6.683E+4	9.[illegible]E+4
6.[illegible]3E+4	1.2[illegible]E+5
6.595E+4	3.0[illegible]E+5
6.5[illegible]E+4	7.244E+5
6.45[illegible]E+4	1.[illegible]E+6
6.4[illegible]E+4	1.5[illegible]E+6
6.371E+4	1.977E+6
6.357E+4	2.39[illegible]E+6
6.34[illegible]E+4	2.396E+6
6.323E+4	1.336E+6
6.308E+4	1.264E+6

ν	α
DATA SET 34 (CONT.)	
6.29[illegible]E+4	1.1[illegible]E+6
6.26[illegible]E+4	1.599E+6
6.252E+4	1.6[illegible]E+6
6.244E+4	1.169E+6
6.215E+4	2.355E+5
6.2[illegible]E+4	1.047E+5
6.156E+4	2.992E+2
6.14[illegible]E+4	1.556E+2
6.1[illegible]E+4	5.997E+1
6.125E+4	1.379E+1
6.115E+4	8.749E+0
6.107E+4	5.152E+0
6.1[illegible]E+4	3.1[illegible]E+0
6.094E+4	2.5[illegible]E+0
6.[illegible]E+4	1.762E+0
6.054E+4	1.282E+0
6.017E+4	8.995E-1
5.992E+4	6.3[illegible]E-1
5.979E+4	5.7[illegible]E-1
5.941E+4	4.592E-1
5.892E+4	4.1[illegible]E-1
5.841E+4	3.0[illegible]E-1
5.787E+4	2.27[illegible]E-1
5.644E+4	1.39[illegible]E-1
DATA SET 35	
T = 85.0	
6.135E+4	1.570E+2
6.126E+4	5.754E+1
6.122E+4	4.1[illegible]E+1
6.117E+4	1.72[illegible]E+1
6.1[illegible]E+4	1.047E+1
6.099E+4	4.26[illegible]E+0
6.094E+4	2.582E+0
6.082E+4	1.762E+0
6.054E+4	1.282E+0
6.017E+4	8.995E-1
5.990E+4	6.310E-1
5.979E+4	5.702E-1

ν	α
DATA SET 35 (CONT.)	
5.[illegible]1E+4	4.59[illegible]E-1
5.[illegible]2E+4	4.1[illegible]E-1
5.[illegible]1E+4	3.[illegible]5E-1
5.737E+4	2.270E-1
5.637E+4	1.3[illegible]E-1
DATA SET 36	
T = 183.0	
6.21[illegible]E+4	1.2[illegible]E+6
6.194E+4	1.159E+6
6.169E+4	7.870E+5
6.15[illegible]E+4	7.[illegible]E+5
6.12[illegible]E+4	2.[illegible]E+5
6.095E+4	9.87[illegible]E+4
6.[illegible]77E+4	1.54[illegible]E+4
5.[illegible]97E+4	1.36[illegible]E+2
5.95[illegible]E+4	3.7[illegible]E+1
5.937E+4	1.25[illegible]E+1
5.927E+4	6.836E+0
5.912E+4	2.779E+0
5.9[illegible]E+4	1.7[illegible]E+0
5.[illegible]E+4	1.1[illegible]E+0
5.[illegible]E+4	6.[illegible]E-1
5.[illegible]E+4	4.[illegible]E-1
5.[illegible]E+4	3.[illegible]E-1
5.794E+4	2.818E-1
5.73[illegible]E+4	2.052E-1
5.644E+4	1.[illegible]63E-1
5.595E+4	1.[illegible]E-1
5.525E+4	1.0[illegible]E-1
DATA SET 37	
T = 295.0	
6.75[illegible]E+4	2.897E+5
6.7[illegible]E+4	2.357E+5
6.633E+4	2.2[illegible]E+5
6.644E+4	2.[illegible]E+5
6.540E+4	1.852E+6

TABLE 34. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE (Wavenumber Dependence) (continued)

DATA SET 37(CONT.)

ν	α
6.564E+4	2.323E+5
6.542E+4	2.023E+5
6.522E+4	2.203E+5
6.499E+4	2.605E+5
6.465E+4	3.047E+5
6.449E+4	4.697E+5
6.394E+4	6.034E+5
6.376E+4	7.045E+5
6.357E+4	7.702E+5
6.327E+4	8.912E+5
6.291E+4	1.005E+6
[illegible]	[illegible]
6.173E+4	1.241E+6
6.151E+4	1.117E+6
6.115E+4	9.517E+5
6.093E+4	9.040E+5
6.073E+4	6.025E+5
6.047E+4	4.030E+5
6.021E+4	1.770E+5
5.991E+4	[illegible]
5.941E+4	5.771E+4
5.953E+4	2.703E+4
5.915E+4	5.937E+3
5.813E+4	[illegible]
5.793E+4	7.550E+1
5.759E+4	3.304E+1
5.749E+4	[illegible]
5.720E+4	[illegible]
5.699E+4	2.505E+0
5.665E+4	9.905E-1
5.637E+4	5.572E-1
5.614E+4	6.911E-1
5.582E+4	1.394E-1
5.550E+4	1.500E-1
5.522E+4	1.219E-1
5.407E+4	1.223E-1

DATA SET 38
T = 373.0

ν	α
5.674E+4	7.178E+1
5.640E+4	2.079E+1
5.607E+4	1.312E+1
5.592E+4	5.754E+0
5.549E+4	1.977E+0
5.528E+4	1.071E+0
5.495E+4	4.550E-1
5.465E+4	3.230E-1
5.439E+4	2.158E-1
5.393E+4	1.270E-1
5.359E+4	1.091E-1
5.320E+4	8.530E-2

DATA SET 39
T = 387.0

ν	α
6.283E+4	6.394E+5
6.259E+4	9.554E+5
6.239E+4	1.110E+6
6.250E+4	1.253E+6
6.219E+4	1.027E+6
6.205E+4	9.214E+5
6.020E+4	6.363E+5
5.993E+4	4.207E+5
5.970E+4	3.002E+5
5.950E+4	2.370E+5
5.924E+4	1.374E+5
5.477E+4	4.875E+4
5.435E+4	1.241E+4

DATA SET 40
T = 477.0

ν	α
6.292E+4	6.729E+5
6.249E+4	8.241E+5
6.197E+4	9.082E+5
6.133E+4	1.090E+6
6.074E+4	1.000E+6
6.030E+4	9.078E+5

DATA SET 40(CONT.)

ν	α
5.993E+4	7.691E+5
5.944E+4	5.249E+5
5.912E+4	3.564E+5
5.877E+4	2.098E+5
5.852E+4	1.472E+5
5.810E+4	6.637E+4
5.790E+4	4.742E+4
5.730E+4	1.506E+4
5.544E+4	1.306E+2
5.526E+4	7.762E+1
5.451E+4	3.235E+1
5.432E+4	2.041E+1
5.430E+4	9.120E+0
5.378E+4	2.937E+0
5.323E+4	8.395E-1
5.267E+4	4.036E-1
5.266E+4	2.729E-1
5.212E+4	1.271E-1
5.180E+4	1.265E-1
5.122E+4	6.983E-2
5.077E+4	6.140E-2
5.010E+4	5.150E-2

DATA SET 41
T = 573.0

ν	α
6.845E+4	3.004E+5
6.810E+4	3.047E+5
6.725E+4	3.981E+5
6.692E+4	3.981E+5
6.643E+4	3.064E+5
6.523E+4	3.504E+5
6.499E+4	3.910E+5
6.436E+4	4.036E+5
6.371E+4	4.699E+5
6.290E+4	5.970E+5
6.217E+4	6.982E+5
6.165E+4	7.906E+5
6.119E+4	8.669E+5
6.054E+4	9.289E+5

DATA SET 41(CONT.)

ν	α
5.994E+4	8.591E+5
5.944E+4	7.516E+5
5.911E+4	6.061E+5
5.876E+4	4.952E+5
5.848E+4	4.017E+5
5.790E+4	2.216E+5
5.730E+4	1.001E+5
5.640E+4	1.520E+4
5.431E+4	2.301E+2
5.377E+4	8.128E+1
5.323E+4	2.642E+1
5.290E+4	1.433E+1
5.268E+4	1.037E+1
5.266E+4	8.165E+0
5.239E+4	4.898E+0
5.239E+4	3.999E+0
5.213E+4	3.515E+0
5.213E+4	2.766E+0
5.132E+4	1.621E+0
5.133E+4	5.649E-1
5.077E+4	2.489E-1
5.025E+4	1.294E-1
4.974E+4	8.240E-2
4.943E+4	5.610E-2
4.981E+4	5.890E-2
4.943E+4	3.640E-2
4.943E+4	3.530E-2
4.534E+4	3.870E-2

DATA SET 42
T = 298.0

ν	α
9.434E+2	8.030E-5

DATA SET 43
T = 300.0

ν	α
9.434E+2	8.930E-4
9.524E+2	7.954E-4
9.709E+2	8.020E-4

DATA SET 43(CONT.)

ν	α
9.901E+2	6.330E-4
1.036E+3	2.100E-3
1.049E+3	2.380E-3

DATA SET 44
T = 300.0

ν	α
9.434E+2	1.950E-4
1.010E+3	1.830E-4
1.034E+3	4.490E-4
1.049E+3	4.120E-4

DATA SET 45
T = 100.0

ν	α
9.434E+2	8.280E-5
9.832E+2	1.132E-4
1.035E+3	4.219E-4
1.047E+3	2.961E-4

DATA SET 46
T = 200.0

ν	α
9.434E+2	1.582E-4
9.832E+2	1.572E-4
1.035E+3	4.465E-4
1.047E+3	3.493E-4

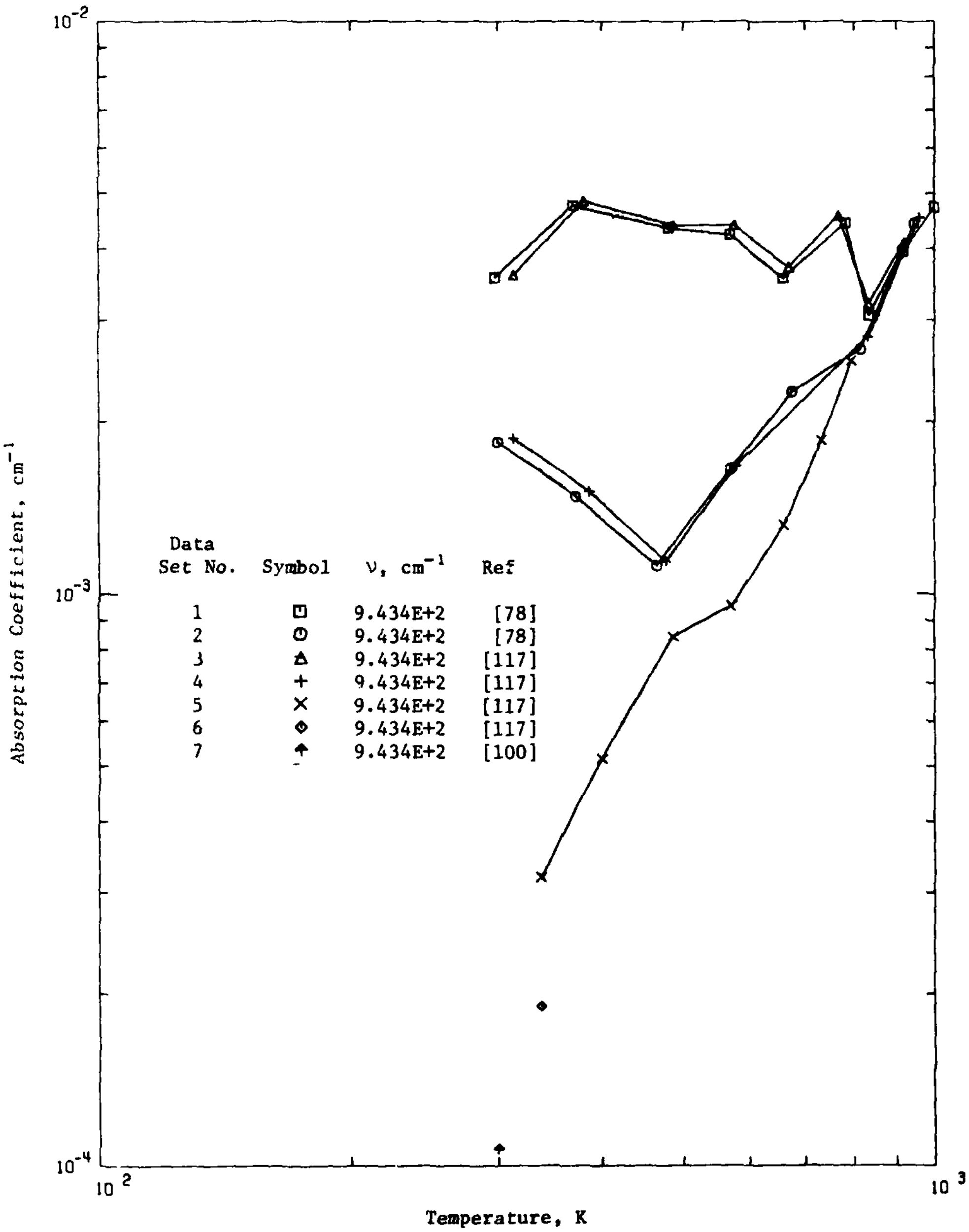

Figure 24. Absorption Coefficient of Potassium Chloride (Temperature Dependence)

TABLE 35. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE (Temperature Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	78	Harrington, J.A. and Hass, M.	1973	C	943.4	297–1000	Single crystal; obtained from the Harshaw Chemical Co.; specimen with surfaces mechanically and then chemically polished; absorption coefficients measured by calorimetric method using a CO_2 laser source; data extracted from a figure.
2	78	Harrington, J.A. and Hass, M.	1973	C	943.4	299–944	Similar to above except for crystal obtained from Hughes Research Laboratories.
3	117	Boyer, L.L., Harrington, J.A., Hass, M., and Rosenstock, H.B.	1974	C	943.4	312–920	Crystal; obtained from the Harshaw Chemical Co.; absorption coefficients measured by calorimetric method with a laser source; data extracted from a figure.
4	117	Boyer, L.L., et al.	1974	C	943.4	312–960	Similar to above except for crystal obtained from the Hughes Co.
5	117	Boyer, L.L., et al.	1974	C	943.4	337–796	Similar to above except for crystals grown by the Naval Research Lab. under conditions designed to minimize the introduction of oxygen-containing impurities which can give rise to absorption bands in the mid-infrared region.
6	117	Boyer, L.L., et al.	1974	C	943.4	337.3	Similar to above except for crystals grown in a CCl_4 reactive atmosphere; it was observed that the crystal grown in this way has the least absorption among the crystals from various sources.
7	100	Rowe, J.M. and Harrington, J.A.	1976	C	943.4	100–300	Single crystals; grown by the reactive-atmosphere-process; obtained from the Naval Research Laboratory; rod specimens of 2.5 cm diameter and of various lengths; chemically etched surface; bulk absorption determined; data extracted from a figure; data at low temperature carried large uncertainty of ±100%; uncertainty diminished toward higher temperatures.

TABLE 36. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE (*Temperature Dependence*)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

T	α
DATA SET 1	
ν = 9.434E+2	
297.1	3.570E-3
358.9	4.750E-3
479.7	[illegible]
563.9	[illegible]
653.1	[illegible]
731.6	[illegible]
833.6	3.0[illegible]E-3
916.2	3.060E-3
[illegible]	4.740E-3
DATA SET 2	
ν = 9.434E+2	
299.2	1.340E-3
371.5	1.430E-3
464.5	1.120E-3
553.8	1.650E-3
676.0	2.250E-3
816.5	2.070E-3
944.6	4.430E-3
DATA SET 3	
ν = 9.434E+2	
312.6	3.610E-3
390.2	4.350E-3
436.4	[illegible]
579.4	[illegible]
659.9	3.720E-3
767.4	4.570E-3
833.7	3.210E-3
920.4	4.110E-3
DATA SET 4	
ν = 9.434E+2	
312.6	1.870E-3
396.4	1.510E-3
476.4	1.140E-3
DATA SET 4(CONT.)	
578.1	1.670E-3
833.7	2.810E-3
959.4	4.540E-3
DATA SET 5	
ν = 9.434E+2	
337.3	3.200E-4
399.0	5.160E-4
430.4	8.430E-4
570.2	9.520E-4
660.7	1.320E-3
730.4	1.850E-3
790.2	2.550E-3
DATA SET 6	
ν = 9.434E+2	
337.3	1.9[illegible]E-4
DATA SET 7	
ν = 9.434E+2	
100.0	3.070E-5
124.0	2.330E-5
150.0	2.330E-5
175.0	3.0[illegible]E-5
199.0	3.830E-5
224.0	4.550E-5
249.0	5.870E-5
274.0	7.870E-5
299.0	1.070E-4

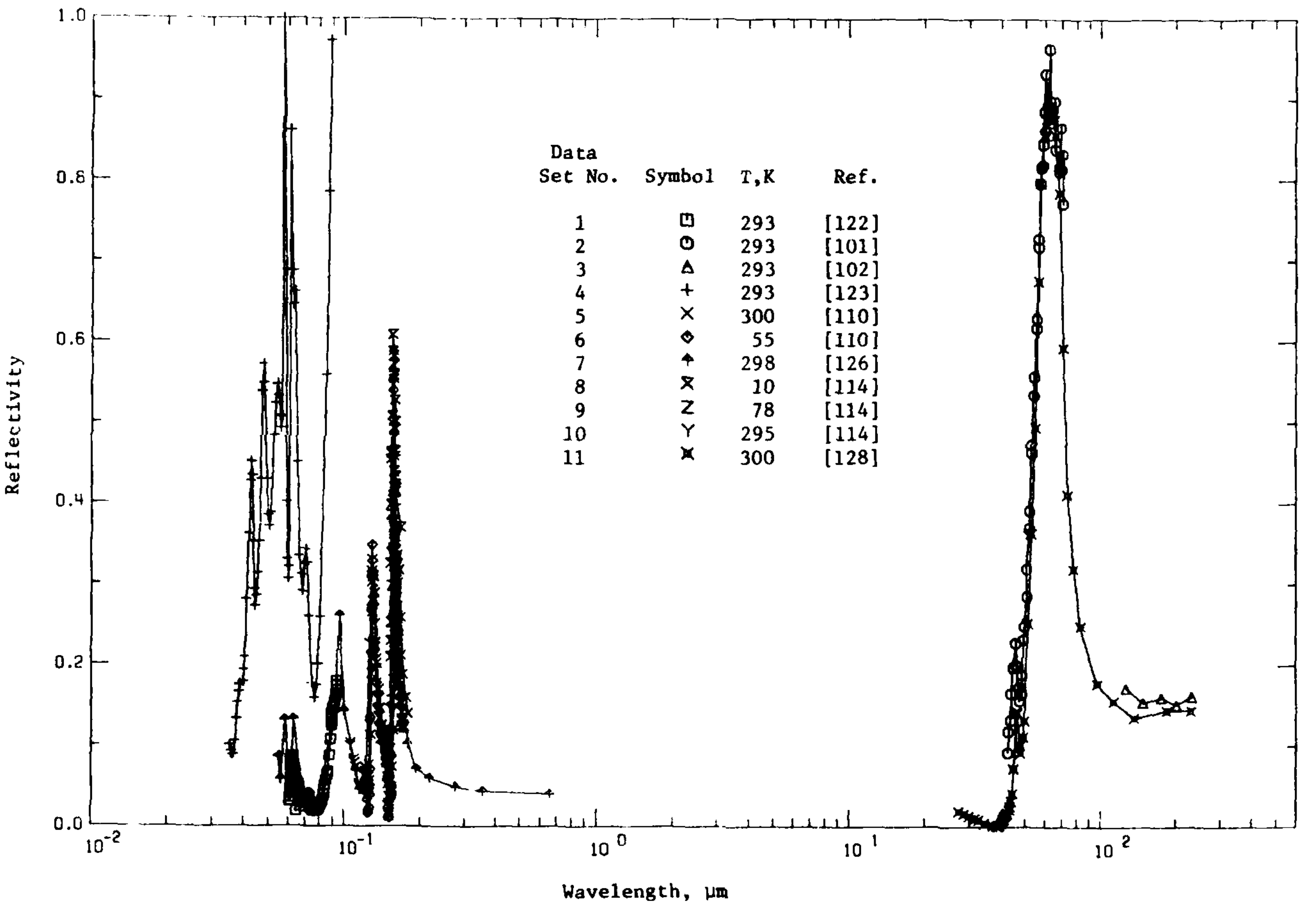

Figure 25. Reflectivity of Potassium Chloride

TABLE 37. SUMMARY OF MEASUREMENTS ON THE REFLECTIVITY OF POTASSIUM CHLORIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	122	Antinori, M., Balzarotti, A., and Piacentini, M.	1973	R	0.061-0.094	293	Single crystal; obtained from the Harshaw Chemical Co.; specimen cleaved in air just before being mounted in the sample chamber to be vacuum pumped; reflection spectrum obtained with a monochromator of band width of 1.5 Å; measurement performed on the same specimen after 24 hrs did not show significant changes and reproduced with uncertainty of about 5%; data extracted from a figure.
2	101	Czerny, M.	1930	R	42.6-70.4	293	Synthetic crystal; plate specimen; polished surface; normal spectral reflectivity obtained with silver mirror as reference; data extracted from a figure; temperature not given, 293 K assumed.
3	102	Cartwright, C.M. and Czerny, M.	1934	R	126.0-231.0	293	Bulk KCl; surface conditions unspecified; near normal reflectivity obtained; linearly averaged values of tabulated data were extracted.
4	12[illegible]	Blechschmidt, D., Klucker, R., and Skibowski, M.	1969	R	0.035-0.089	293	Single crystals provided by Karl Korth, Kiel, Germany; freshly cleaved specimen; near normal reflectivity measured in vacuum for polarized light with normal of the specimen lying on both sides of the incident beam for increased accuracy; data extracted from a figure.
5	110	Baldini, G. and Bosacchi, B.	1968	R	0.122-0.179	300	Single crystals; specimen with cleaved surface; back surface of the specimen treated with an emery cloth to reduce the reflection from the back; near normal reflectivity obtained with specimen in vacuum; data extracted from a figure.
6	110	Baldini, G. and Bosacchi, B.	1968	R	0.120-0.170	55	Same as above except at low temperature.
7	126	Philipp, H.R. and Ehrenreich, H.	1963	R	0.055-0.653	298	Single crystal; near normal reflection spectrum measured; data extracted from a curve.
8	114	Tomiki, T.	1967	R	0.147-0.171	10	Single crystal; grown by the Kyropoulos technique; specimen cleaved from the grown ingots; near normal reflectivity measured; data extracted from a figure.
9	114	Tomiki, T.	1967	R	0.147-0.173	78	Same as above.
10	114	Tomiki, T.	1967	R	0.106-0.148	295	Same as above.
11	123	Johnson, K. and Bell, E.	1969	R	27.2-229.2	300	Single crystal; well polished single surface; reflectivity measured by asymmetric Fourier-transform spectroscopy; data extracted from a figure.

TABLE 38. EXPERIMENTAL DATA ON THE REFLECTIVITY OF POTASSIUM CHLORIDE

[Wavelength, λ, μm; Temperature, T, K; Reflectivity, ρ]

DATA SET 1
T = 293.0

λ	ρ
0.0600	0.0347
0.0606	0.0354
0.0609	0.0412
0.0611	0.0402
0.0612	0.0511
0.0613	0.0502
0.0614	0.0629
0.0615	0.0739
0.0615	0.0870
0.0617	0.0924
0.0619	0.0737
0.0621	0.0516
0.0623	0.0746
0.0627	0.0516
0.0629	0.0592
0.0631	0.0576
0.0635	0.0502
0.0636	0.0548
0.0639	0.0602
0.0641	0.0643
0.0643	0.0552
0.0650	0.0537
0.0653	0.0515
0.0658	0.0523
0.0661	0.0510
0.0665	0.0432
0.0669	0.0388
0.0673	0.0353
0.0675	0.0365
0.0679	0.0365
0.0682	0.0293
0.0687	0.0279
0.0693	0.0279
0.0707	0.0324
0.0714	0.0351
0.0718	0.0351
0.0720	0.0319
0.0734	0.0290
0.0742	0.0249

DATA SET 1 (CONT.)

λ	ρ
0.0748	0.0214
0.0755	0.0194
0.0766	0.0183
0.0775	0.0133
0.0787	0.0193
0.0795	0.0213
0.0804	0.0237
0.0811	0.0267
0.0817	0.0305
0.0822	0.0348
0.0828	0.0395
0.0833	0.0455
0.0839	0.0507
0.0848	0.0575
0.0860	0.0638
0.0864	0.0673
0.0870	0.0875
0.0885	0.1076
0.0892	0.1249
0.0893	0.1268
0.0894	0.1325
0.0897	0.1387
0.0904	0.1448
0.0910	0.1496
0.0920	0.1543
0.0926	0.1593
0.0930	0.1642
0.0933	0.1387
0.0935	0.1746
0.0939	0.1800

DATA SET 2
T = 293.0

λ	ρ
42.6	0.092
42.7	0.116
43.7	0.132
43.8	0.165
44.8	0.197
45.9	0.227

DATA SET 2 (CONT.)

λ	ρ
46.1	0.200
47.2	0.156
47.2	0.173
48.3	0.164
48.4	0.188
49.4	0.232
49.6	0.249
50.6	0.285
50.7	0.319
51.8	0.369
51.9	0.391
52.9	0.473
53.1	0.463
54.1	0.557
54.2	0.534
55.2	0.617
55.4	0.629
56.4	0.728
56.5	0.713
57.5	0.797
57.7	0.826
58.7	0.819
58.8	0.845
58.8	0.886
59.8	0.933
59.9	0.962
61.0	0.934
61.2	0.884
62.2	0.963
62.3	0.953
63.3	0.859
63.4	0.872
64.6	0.939
65.7	0.939
67.9	0.812
68.1	0.917
69.1	0.956
69.3	0.814
70.3	0.933
70.4	0.772

DATA SET 3
T = 293.0

λ	ρ
126.0	0.172
147.0	0.154
174.0	0.160
200.0	0.151
231.0	0.161

DATA SET 4
T = 293.0

λ	ρ
0.0353	0.191
0.0357	0.093
0.0361	0.069
0.0365	0.069
0.0371	0.105
0.0375	0.133
0.0378	0.153
0.0383	0.166
0.0386	0.175
0.0398	0.178
0.0402	0.193
0.0406	0.219
0.0411	0.200
0.0421	0.362
0.0426	0.427
0.0430	0.451
0.0433	0.434
0.0438	0.352
0.0440	0.293
0.0444	0.272
0.0450	0.265
0.0455	0.313
0.0459	0.352
0.0466	0.436
0.0474	0.538
0.0476	0.572
0.0491	0.549
0.0494	0.430
0.0499	0.365
0.0503	0.371

DATA SET 4 (CONT.)

λ	ρ
0.0510	0.389
0.0527	0.484
0.0534	0.523
0.0544	0.547
0.0550	0.533
0.0555	0.505
0.0561	0.493
0.0566	0.507
0.0575	0.600
0.0586	0.689
0.0592	0.402
0.0596	0.330
0.0601	0.335
0.0605	0.321
0.0614	0.852
0.0622	0.685
0.0628	0.640
0.0635	0.662
0.0655	0.450
0.0666	0.334
0.0675	0.311
0.0685	0.291
0.0699	0.323
0.0709	0.343
0.0718	0.320
0.0724	0.260
0.0747	0.177
0.0761	0.159
0.0777	0.175
0.0790	0.201
0.0805	0.259
0.0851	0.559
0.0874	0.786
0.0887	0.973

DATA SET 5
T = 300.0

λ	ρ
0.122	0.0729
0.124	0.0609

DATA SET 5 (CONT.)

λ	ρ
0.125	0.0552
0.125	0.0519
0.126	0.0559
0.127	0.1132
0.128	0.1887
0.129	0.2642
0.129	0.3019
0.130	0.3050
0.131	0.3093
0.132	0.2884
0.135	0.2013
0.137	0.1694
0.139	0.1493
0.141	0.1247
0.143	0.1170
0.145	0.1103
0.145	0.1044
0.149	0.0949
0.151	0.0869
0.152	0.0453
0.153	0.0407
0.154	0.0440
0.155	0.0732
0.156	0.1133
0.157	0.1815
0.158	0.2574
0.159	0.2831
0.160	0.3040
0.163	0.3341
0.165	0.3152
0.167	0.2532
0.169	0.2108
0.171	0.1874
0.175	0.1592
0.179	0.1399

DATA SET 6
T = 55.0

λ	ρ
0.121	0.0632

TABLE 36. EXPERIMENTAL DATA ON THE REFLECTIVITY OF POTASSIUM CHLORIDE (continued)

λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ
DATA SET 6(CONT.)		DATA SET 6(CONT.)		DATA SET 8		DATA SET 8(CONT.)		DATA SET 9(CONT.)		DATA SET 10(CONT.)	
				T = 10.0							
0.121	0.3578	0.163	0.2419			0.164	0.190	0.161	0.255	0.126	0.3762
0.123	0.0443	0.164	0.2032	0.147	0.094	0.165	0.172	0.162	0.271	0.126	0.0257
0.123	0.0334	0.166	0.1729	0.147	0.078	0.166	0.153	0.162	0.259	0.127	0.2262
0.125	0.0130	0.168	0.1573	0.148	0.052	0.170	0.129	0.162	0.240	0.128	0.2014
0.125	0.0101	0.169	0.1469	0.149	0.028	0.170	0.123	0.163	0.230	0.129	0.3022
0.126	0.0221			0.150	0.016			0.163	0.224	0.129	0.3093
0.126	0.0396	DATA SET 7		0.151	0.016	DATA SET 9		0.164	0.209	0.129	0.3151
0.127	0.2701	T = 299.0		0.151	0.054	T = 78.0		0.165	0.191	0.130	0.3303
0.127	0.1345			0.152	0.095			0.165	0.197	0.130	0.3052
0.128	0.2147	0.055	0.036	0.153	0.209	0.147	0.102	0.168	0.105	0.131	0.2710
0.129	0.2735	0.055	0.058	0.153	0.229	0.147	0.087	0.170	0.132	0.132	0.2503
0.129	0.3140	0.058	0.131	0.153	0.325	0.148	0.061	0.170	0.131	0.133	0.2269
0.130	0.3475	0.061	0.042	0.154	0.398	0.149	0.036	0.170	0.129	0.133	0.2216
0.130	0.3226	0.063	0.132	0.154	0.454	0.150	0.016	0.172	0.124	0.134	0.2057
0.131	0.2741	0.069	0.034	0.155	0.461	0.151	0.013	0.172	0.121	0.134	0.1947
0.133	0.2177	0.072	0.041	0.155	0.508	0.151	0.020			0.135	0.1773
0.134	0.1770	0.073	0.041	0.156	0.588	0.152	0.055	DATA SET 10		0.136	0.1603
0.135	0.0435	0.076	0.023	0.156	0.603	0.153	0.155	T = 295.0		0.136	0.1573
0.138	0.0257	0.078	0.120	0.156	0.608	0.153	0.252			0.137	0.1440
0.139	0.1142	0.081	0.030	0.157	0.582	0.154	0.297	0.106	0.1333	0.137	0.1352
0.141	0.1134	0.089	0.129	0.157	0.553	0.154	0.385	0.106	0.1003	0.139	0.1192
0.143	0.1054	0.092	0.141	0.157	0.493	0.155	0.463	0.109	0.0831	0.140	0.1105
0.143	0.1344	0.096	0.201	0.157	0.420	0.156	0.557	0.110	0.0769	0.141	0.1050
0.145	0.0104	0.100	0.143	0.157	0.373	0.156	0.571	0.111	0.0725	0.142	0.1004
0.145	0.1114	0.111	0.069	0.158	0.321	0.157	0.570	0.112	0.0673	0.143	0.0973
0.147	0.0109	0.115	0.046	0.158	0.268	0.157	0.559	0.114	0.0526	0.144	0.0920
0.147	0.1124	0.120	0.047	0.158	0.271	0.157	0.490	0.115	0.0493	0.145	0.0904
0.149	0.0301	0.122	0.041	0.158	0.353	0.158	0.439	0.116	0.0478	0.146	0.0804
0.150	0.0295	0.129	0.300	0.159	0.457	0.158	0.377	0.116	0.0497	0.146	0.0850
0.151	0.0102	0.140	0.103	0.159	0.527	0.158	0.354	0.117	0.0445	0.147	0.0843
0.152	0.0324	0.147	0.076	0.159	0.501	0.158	0.324	0.118	0.0475	0.148	0.0806
0.153	0.0974	0.153	0.041	0.159	0.414	0.159	0.342	0.119	0.0401	0.149	0.0732
0.154	0.2570	0.151	0.302	0.167	0.369	0.159	0.366	0.120	0.0435	0.150	0.0593
0.155	0.3435	0.167	0.157	0.160	0.340	0.159	0.417	0.121	0.0405	0.151	0.0435
0.156	0.3135	0.173	0.102	0.160	0.307	0.160	0.464	0.121	0.0385	0.151	0.0456
0.157	0.5395	0.193	0.071	0.161	0.293	0.160	0.433	0.123	0.0302	0.152	0.0420
0.157	0.4043	0.217	0.060	0.161	0.267	0.160	0.403	0.123	0.0362	0.152	0.0365
0.158	0.3228	0.275	0.049	0.162	0.236	0.160	0.358	0.124	0.0372	0.153	0.0325
0.160	0.4230	0.354	0.044	0.163	0.210	0.161	0.341	0.125	0.0429	0.153	0.0308
0.161	0.3140	0.652	0.046	0.163	0.201	0.161	0.314	0.125	0.0552	0.154	0.0365

TABLE 38. EXPERIMENTAL DATA ON THE REFLECTIVITY OF POTASSIUM CHLORIDE (continued)

λ	ρ	λ	ρ
DATA SET 10(CONT.)		DATA SET 11(CONT.)	
0.154	0.0422	43.1	0.021
0.154	0.0431	43.4	0.025
0.155	0.0731	43.7	0.032
0.155	0.0803	44.3	0.041
0.156	0.1239	45.0	0.072
0.156	0.1420	45.9	0.142
0.157	0.1593	46.3	0.142
0.157	0.2041	47.3	0.101
0.158	0.2155	47.7	0.091
0.158	0.2200	48.5	0.111
0.159	0.2591	49.5	0.131
0.160	0.3042	51.1	0.252
0.160	0.3142	52.3	0.363
0.161	0.3221	54.7	0.494
0.161	0.3193	56.2	0.675
0.162	0.3129	57.3	0.797
0.162	0.3085	59.5	0.857
0.163	0.3001	62.6	0.877
		[illegible]	0.887
DATA SET 11		64.3	0.876
T = 300.0		65.6	0.856
		68.3	0.785
27.2	0.019	70.5	0.593
28.5	0.016	73.6	0.411
29.8	0.013	78.1	0.319
31.5	0.010	83.1	0.248
32.6	0.009	97.0	0.177
34.5	0.004	112.3	0.156
37.1	0.001	136.2	0.135
38.5	[illegible]	163.1	0.144
39.2	[illegible]	229.0	0.144
39.4	0.002		
40.2	0.005		
40.6	0.007		
40.8	0.009		
41.0	0.011		
41.4	0.013		
41.7	0.014		
42.0	0.015		
42.4	0.017		

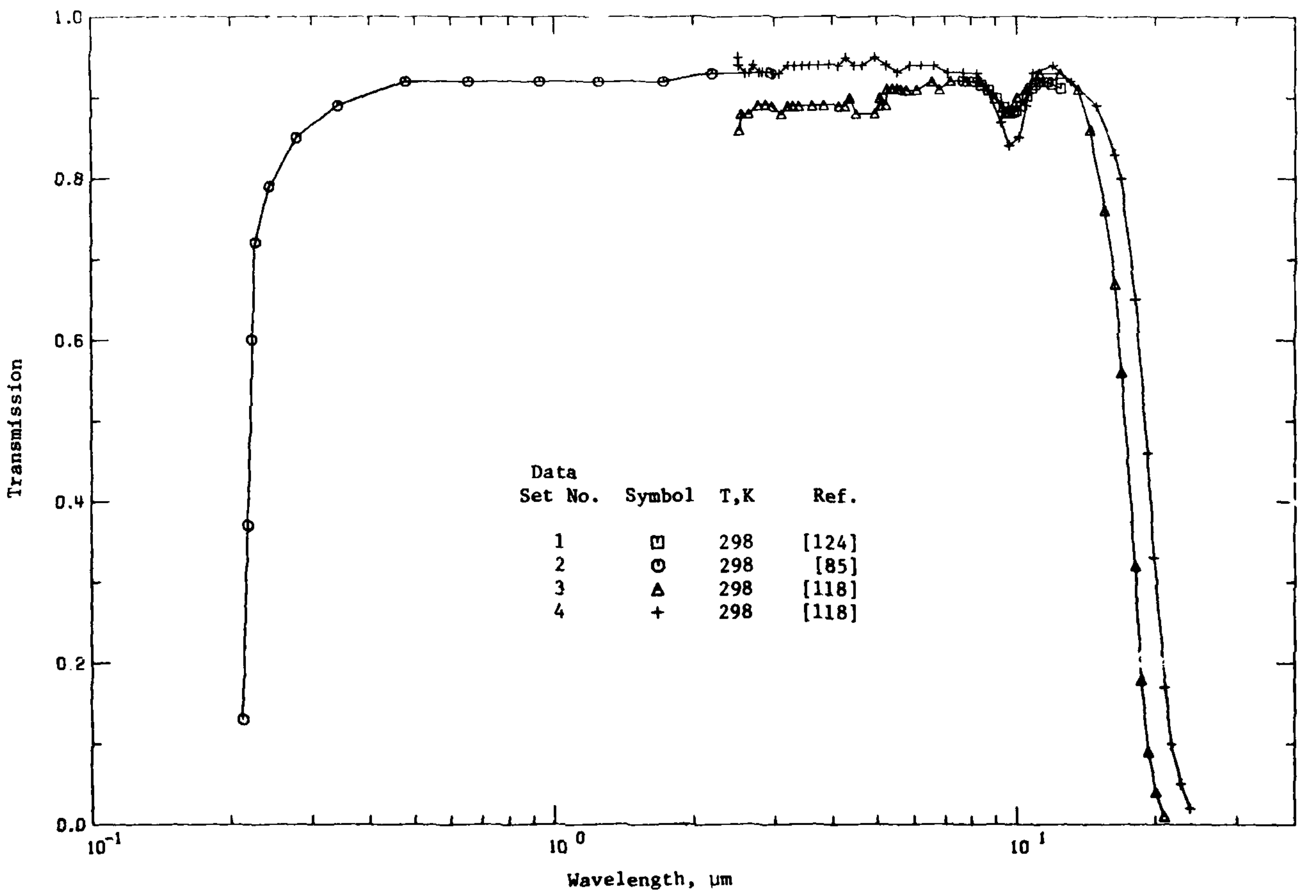

Figure 26. Transmission of Potassium Chloride

TABLE 39. SUMMARY OF MEASUREMENTS ON THE TRANSMISSION OF POTASSIUM CHLORIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	124	Deutsch, T.F.	1974	T	7.69-12.50	298	Single crystal; bar specimens of 6.4 cm long; transmission measured with 1% error; data extracted from a figure.
2	85	McCarthy, D.E.	1967	T	0.17-3.0	298	Synthetic crystal; plate specimen of 10.0 mm thick with surfaces parallel to within 0.001 mm/mm of length and flat to within 10 fringes or better of the mercury green line; measurements made on double-beam instruments with accuracy of ±2%; data extracted from a figure; temperature not given, 298 K assumed.
3	118	Deutsch, T.F.	1975	T	2.5-21.0	298	Single crystal; specimen of 6.4 cm thick; spectrophotometer used in the transmission measurements; a broad absorption band centered at 9.8 μm observed, the wings of which clearly extended to 10.6 μm; data extracted from a figure.
4	118	Deutsch, T.F.	1975	T	2.5-21.0	298	Same as above except for a specimen of 2.35 cm thick.

TABLE 46. EXPERIMENTAL DATA ON THE TRANSMISSION OF POTASSIUM CHLORIDE

[Wavelength, λ, μm; Temperature, T, K; Transmission, τ]

DATA SET 1
T = 298.0

λ	τ
7.69	0.920
8.11	0.920
8.41	0.916
8.71	0.910
9.05	0.900
9.25	0.899
9.51	0.902
9.63	0.890
9.92	0.891
9.98	0.893
10.19	0.889
10.52	0.902
10.79	0.912
[illegible]	0.915
11.27	0.920
11.65	0.920
11.97	0.917
12.50	0.912

DATA SET 2
T = 3[illegible]

λ	τ
[illegible]	[illegible]
0.213	0.37
0.223	0.60
0.225	0.72
0.243	0.79
0.275	0.85
0.34[illegible]	0.89
0.479	0.92
0.655	0.92
0.933	0.92
1.25	0.92
1.73	0.92
2.22	0.93
2.95	0.93

DATA SET 3
T = [illegible]

λ	τ
2.51	0.86
2.53	0.88
2.63	0.88
2.76	0.89
2.86	0.89
2.96	0.89
3.09	0.88
3.20	0.89
3.28	0.89
3.39	0.89
3.61	0.89
3.83	0.89
4.13	0.89
4.26	0.89
4.37	0.90
4.49	0.88
4.93	0.88
5.07	0.89
5.[illegible]7	0.90
5.22	0.89
5.27	0.91
5.42	0.91
5.54	0.91
5.64	0.91
5.79	0.91
6.10	0.91
6.58	0.92
6.93	0.91
7.22	0.92
7.82	0.92
8.36	0.92
8.93	0.90
9.45	0.88
10.02	0.90
10.51	0.91
11.22	0.93
12.44	0.93
13.61	0.91
14.42	0.86

DATA SET 3(CONT.)

λ	τ
15.55	0.76
16.36	0.67
16.65	0.55
18.11	0.32
18.72	0.18
19.38	0.09
20.09	0.04
20.66	0.02

DATA SET 4
T = 3[illegible]

λ	τ
2.50	0.95
2.51	0.94
2.60	0.93
2.65	0.93
2.70	0.94
2.78	0.93
2.82	0.93
2.88	0.93
2.98	0.93
3.07	0.93
3.21	0.94
3.31	0.94
3.44	0.94
3.57	0.94
3.73	0.94
3.94	0.94
4.12	0.94
4.28	0.95
4.46	0.94
4.65	0.94
4.95	0.95
5.23	0.94
5.54	0.93
5.87	0.94
6.22	0.94
6.64	0.94
7.12	0.93
7.76	0.93

DATA SET 4(CONT.)

λ	τ
8.22	0.93
8.68	0.91
9.24	0.87
9.65	0.84
10.10	0.85
10.49	0.89
11.36	0.93
12.06	0.94
13.16	0.92
14.87	0.89
16.33	0.83
16.83	0.80
18.09	0.65
19.19	0.46
19.89	0.33
21.13	0.27
21.66	0.16
22.79	0.05
23.79	0.02

TABLE 41. PEAK POSITIONS (λ_{max}) IN μm AND HALF-WIDTHS (W) IN eV FOR THE F, R, M, AND N ABSORPTION BANDS IN POTASSIUM CHLORIDE *

Interionic dist., d (Å)	Temp.	F band λ_{max}	F band W	R_1 band λ_{max}	R_2 band λ_{max}	M band λ_{max}	M band W	N bands λ_{max}
3.14	RT	(0.576)†		(0.669)	(0.725)	(0.835)		
		0.556	0.31	0.680	0.740	0.820	0.12	
		0.557	0.34			0.822-0.825	0.13	
		0.560	0.35			0.825		
		0.562	0.36			0.830		
		0.563	0.39					
	NT	0.534	0.19	0.650	0.724	0.800-0.820	0.06-0.07	N_1: 0.955
		0.538	0.2	0.656	0.725	0.801-0.802	0.09	N_2: 1.080
		0.539	0.22	0.657	0.727	0.803		N_1: 0.966
		0.540	0.26	0.658	0.729	0.805		W = 0.08
		0.543	0.3	0.659	W = 0.08	0.808		N_2: 1.028
		0.546		W = 0.12				W = 0.09
	HT	0.536	0.16			0.798-0.799	0.05-0.06	
		0.537	0.17					
		0.539	0.18					

* Values were taken from Ref. [69].

† Values given in parentheses are calculated from the Ivey relations [70].

F band $\lambda_{max} = 703\ d^{1.84}$ for NaCl structure, $\lambda_{max} = 251\ d^{2.5}$ for CsCl structure.

R_1 band $\lambda_{max} = 816\ d^{1.84}$

R_2 band $\lambda_{max} = 884\ d^{1.84}$

M band $\lambda_{max} = 1400\ d^{1.56}$

TABLE 42. RECOMMENDED VALUES ON ABSORPTION COEFFICIENT OF POTASSIUM CHLORIDE IN IR REGION AT 300 K

ν, cm^{-1}	λ, μm	Absorption Coefficient, cm^{-1}	
		Intrinsic*	Observed† (Selected)
4.000E+02	25.0	3.3E+0	
4.490E+02	22.3	1.2E+0	1.1E+0
4.970E+02	20.1	4.9E-1	4.6E-1
5.000E+02	20.0	4.6E-1	
5.510E+02	18.1	1.6E-1	1.6E-1
5.992E+02	16.7	6.5E-2	6.2E-2
6.439E+02	15.5	2.7E-2	2.4E-2
6.969E+02	14.3	9.5E-3	8.8E-3
7.502E+02	13.3	3.3E-3	3.2E-3
8.000E+02	12.5	1.2E-3	1.3E-3
8.540E+02	11.7	4.3E-4	1.0E-4
9.000E+02	11.1	1.7E-4	1.0E-4
9.310E+02	10.7	9.5E-5	1.6E-3
9.434E+02	10.6	7.4E-5	6.0E-5(B), 1.2E-4(T)
9.756E+02	10.3	3.9E-5	3.3E-5(B), 1.0E-4(T)
9.780E+02	10.2	3.7E-5	4.5E-3
9.950E+02	10.1	2.7E-5	5.3E-3
1.028E+03	9.73	1.4E-5	6.5E-3
1.047E+03	9.55	9.7E-6	9.0E-6(B), 9.0E-5(T)
1.079E+03	9.27	5.1E-6	1.8E-5(B), 8.0E-5(T)
1.122E+03	8.91	2.2E-6	2.6E-3
1.174E+03	8.52	7.9E-7	9.8E-4
1.202E+03	8.32	4.6E-7	4.8E-4
1.232E+03	8.12	2.5E-7	1.3E-4
1.245E+03	8.03	1.9E-7	6.0E-5
1.300E+03	7.69	6.6E-8	
1.887E+03	5.30	6.4E-13	5.0E-7(B), 4.2E-6(T)
2.632E+03	3.80	2.7E-19	6.5E-6(B), 5.6E-5(T)
3.571E+03	2.80		5.5E-6(B), 5.9E-5(T)

*Intrinsic values were calculated according to Eq. (32) with uncertainties about ±10%.

†Values in this column are the total abosprtion coefficient which are either lowest reported or those used to define the constants in Eq. (32). Uncertainties of these values are about ±10%. Values lower than 1.0E-3 carry higher uncertainties up to ±30%. Letters in the parentheses have the following meaning: B - bulk absorption and T - total absorption.

3.5. Potassium Bromide, KBr

Potassium bromide has optical characteristics similar to those of rock salt, but, having a higher molecular weight, it transmits further into the infrared. Crystals up to 11 kg in size are available from the Harshaw Chemical Company. Very pure samples have been obtained and they can be cleaved easily. KBr is of interest to designers of optical instruments because of its transparency in the infrared region. Although KBr is transparent from 0.20 to 42 μm, the useful region is from 0.3 to 30 μm because strong absorption occurs near the transparency limits.

Measurements of the refractive index of KBr date back to 1874. For the transparent region experimental values were obtained mainly by the deviation method and reported by Spindler and Rodney [130], Stephens et al. [131], Forrest [132], Harting [30], and Gundelach [133]. For low ultraviolet and far infrared wavelengths, there were no measurements until 1967, when Vishnevskii et al. [134] reported their results for the region from 0.170 to 0.197 μm and Handi et al. [24] reported results for the range of 35 to 770 μm.

Li [33] reduced the then available experimental data on the refractive index to a common temperature of 293 K and after careful critical evaluation and analysis adopted a Sellmeier type dispersion equation to calculate refractive index at 293 K in the transparent wavelength region, 0.20 to 42.0 μm.

$$n^2 = 1.39408 + \frac{0.79221\ \lambda^4}{\lambda^2-(0.146)^2} + \frac{0.01981\ \lambda^2}{\lambda^2-(0.173)^2} + \frac{0.15587\ \lambda^2}{\lambda^2-(0.187)^2} + \frac{0.17673\ \lambda^2}{\lambda^2-(60.61)^2} + \frac{2.06217\ \lambda^2}{\lambda^2-(87.72)^2} \tag{33}$$

where λ is in units of μm.

Investigations of the absorption coefficient for practical applications are generally classified into three wavelength regions: the ultraviolet and the far infrared absorption edges and the transparent regions. In the ultraviolet region, Martienssen [135] investigated absorption coefficients of KBr in the range 0.18 to 0.30 μm and at 20 to 1000 K. He found that the expression

$$\alpha(f,T) = \alpha_o e^{-\sigma h(f_o-f)/kT}$$

can be used to describe the absorption behavior of KBr crystals. The constants in the equation were found to be $\alpha_o = 2.4 \times 10^6\ cm^{-1}$, $\sigma = 0.79$, and $hf_o = 6.76$ eV. Tomiki et al. [71] studied the absorption of KBr in the wavelength range between 0.170 and 0.240 μm for the purpose of determining the Urbach-rule parameters and finding the features characteristic of the intrinsic tail. Through a systematic observation and analysis they found the empirical relations of the parameters:

$$E_o = 6.840 \text{ eV}$$
$$\alpha_o = 0.6 \times 10^{10}\ cm^{-1}$$
$$hf = 10.5 \text{ meV}$$
$$\sigma_{so} = 0.774$$

for the expression of absorption coefficient of the intrinsic tail

$$\alpha = \alpha_o \exp[-\sigma_s(T)(E_o-E)/kT], \quad (34)$$

where

$$\sigma_s(T) = \sigma_{so} \frac{2kT}{hf} \tanh \frac{hf}{2kT}$$

Measurements of absorption coefficients in the infrared transparent region are recent occurrences as the development of high-power I.R. lasers has led to a need for better characterization of I.R. window materials. Among other factors, the absorption coefficient plays a decisive role in determining whether a material is adequate for laser optical components. For this reason, absorption coefficients of a number of selected materials were investigated at wavelengths of laser interest. Potassium bromide is among the best laser window materials and its absorption coefficients at wavelengths 1.06, 2.7, 3.8, 5.3, and 10.6 μm were intensively studied in order to determine the influencing factors that contribute to the extrinsic absorption. These studies are very informative and provide clues and means for material preparation and parts fabrication in order to minimize the extrinsic components in the absorption.

Deutsch [12], using a differential technique with a dual beam spectrometer, obtained abosrption coefficients for KBr samples in the wavelength range 16.7-33.3 μm. It was found that the observed absorption coefficient together with earlier literature data in the multiphonon absorption region could be represented by the expression

$$\alpha = \alpha_o \exp(-\nu/\nu_o) \qquad (35)$$

where

$\alpha_o = 6{,}077\ cm^{-1}$, $\nu_o = 39.1\ cm^{-1}$

This expression, based on the available data that cover the regions $\alpha = 0.002$ to $12\ cm^{-1}$ and $\nu = 250$ to $600\ cm^{-1}$, is believed to represent the intrinsic absorption of KBr. Extrapolations to the wavelengths 10.6 and 5.3 μm yield intrinsic absorption coefficients of $2.0 \times 10^{-7} cm^{-1}$ and $8 \times 10^{-18} cm^{-1}$, respectively. These values are considerably lower than the corresponding experimental results [118], of $4.2 \times 10^{-4} cm^{-1}$ and $2.1 \times 10^{-4} cm^{-1}$, respectively.

Hass et al. [119] measured absorption coefficients by calorimetric techniques at 1.06, 2.7, and 3.8 μm for a number of KBr samples. The results at 1.06 μm were usually in the $10^{-5} cm^{-1}$ region with the lowest reported value at $<3 \times 10^{-6} cm^{-1}$ which was very close to the limit of their instrument sensitivity. However, at wavelengths 2.7 and 3.8 μm, their best measurements yielded $1.2 \times 10^{-4} cm^{-1}$ and $2.2 \times 10^{-4} cm^{-1}$, respectively. From the observed similarities of a number of other quality crystals, they estimated the absorption coefficient of KBr at 5.3 μm should be in the region $10^{-5} cm^{-1}$ or lower. Compared with the absorption coefficients at these wavelengths, the data imply excess absorption at 2.7 and 3.8 μm even in the purest available crystals. This has been observed not only in the KBr crystals but also in a number of alkali halide and alkaline earth fluoride crystals. The origin of such excessive absorption was not clearly understood. The authors suggested the possibility that this was associated with the OH and CH impurities. If these were eliminated, the absorption level at 2.7 and 3.8 μm could be reduced to the level of $10^{-5} cm^{-1}$ or lower.

In a later study, Klein [120] investigated the origins of the excessive extrinsic absorption at 2.7 and 3.8 μm. Correlation with vacuum-ultraviolet absorption measurements indicated that all of the excess 2.7 μm absorption can be accounted for by the OH^- content of the crystals. At 3.8 μm, the surplus absorption are most likely contributed by the carbon-oxygen lineages, e.g., COF_2, CO_3^{-2}, HCO_3^-, in the specimens. He suggested that diminishing residual absorption at these wavelengths can be achieved by the substitution of hydrogen halides for carbon tetrachloride in the purification procedures and treating the salt below its melting point.

Rowe and Harrington [121] and Klein et al. [136] produced purified KBr crystals by reactive-halide purification processes with various reagents in an effort to minimize oxygen-containing impurities which are known to contribute significantly to extrinsic absorption in the 10.6 μm region. Among the reagents attempted, carbon tetrachloride processing yielded a KBr crystal that had one of the lowest bulk absorption coefficients at 10.6 μm. Among the samples measured, one sample had a bulk absorption coefficient of $7 \times 10^{-6} cm^{-1}$, the lowest for any solid, at 10.6 μm, that so far has been known; even lower than that for KCl crystal. Similar to KCl, for all the KBr samples measured, there exists a persistant absorption band at 9.6 μm. For the purest and best polished crystal, the absorption coefficient at 9.6 μm is greater than that at 10.6 μm by a factor of 2 to 3, yet the near-intrinsic behavior requires a lesser absorption at 9.6 μm. Unless this absorption band were eliminated, or reduced considerably, through purification and polishing process, the use of KBr in the 9.0-9.6 μm region would be limited. Since the method used in their investigation was able to identify the bulk and surface absorptions, an important finding was that the extrinsic absorption band near 9.6 μm is not due entirely to surface absorption, but is in fact due to impurity sources present in the bulk as well as on the surface of the sample.

Figures 27 to 30 are plots of the available data. The pertinent information of each data source and the corresponding original values are given in Tables 43 to 46. In addition, available information and data on the reflectivity and transmission are also presented in the same manner (in Figures 31 and 32 and Tables 47 to 50), for completeness and comparison. For the visible and near visible regions, Table 51 gives the spectral positions of the well known color centers. Noticeable absorptions are likely to occur at these centers when the crystal is exposed to ultraviolet, x-ray, or high energy radiations. However, these absorption bands may disappear at high temperatures or eliminated by appropriate irradiation, corresponding to the so-called "the thermal and optical bleaching of color centers."

Recommended values given in Table 52 were calculated from Eq. (35). In the range between 16.7 to 35 μm, these values are supported by measurements of Deutsch [12] and Barker [38]. In the laser wavelength region, the predicted values are lower than the existing data. It is not known if Eq. (35) holds for this region because the observation of very low absorption is handicapped

by the limit of the best available instrument sensitivity. However, like most of optical crystals, one expects to observe absorption bands in the range between 2.6 to 2.8 μm and at 3.8 μm due to the hydroxyl ions in the crystal and due to surface contamination. These absorption bands can be eliminated through improved crystal growing and polishing techniques. Therefore, it should be noted that the values in the "intrinsic" column are the lower limits that one can obtain for ideal samples. In practice, the observed values are higher than the limiting values at low absorption levels. Unless values appear in the "observed" column, the limiting values are considered as guidelines for estimation and investigation.

Although it was not the intent of this study to evaluate the absorption data in the vacuum ultraviolet region, in order to provide the users a total picture of the available absorption data, the plots of available data in this region are given in the Appendix to this report.

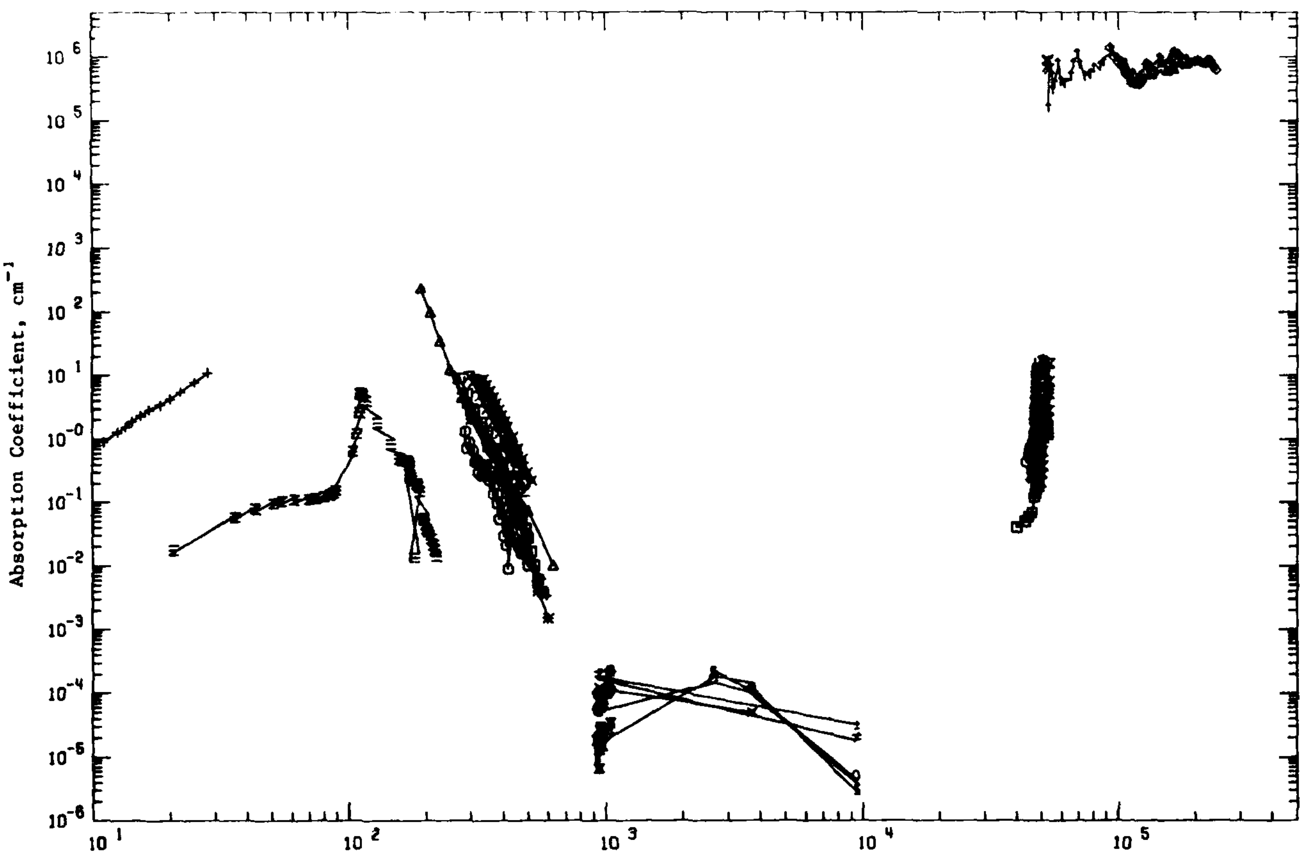

Figure 27. Absorption Coefficient of Potassium Bromide (Wavenumber Dependence)

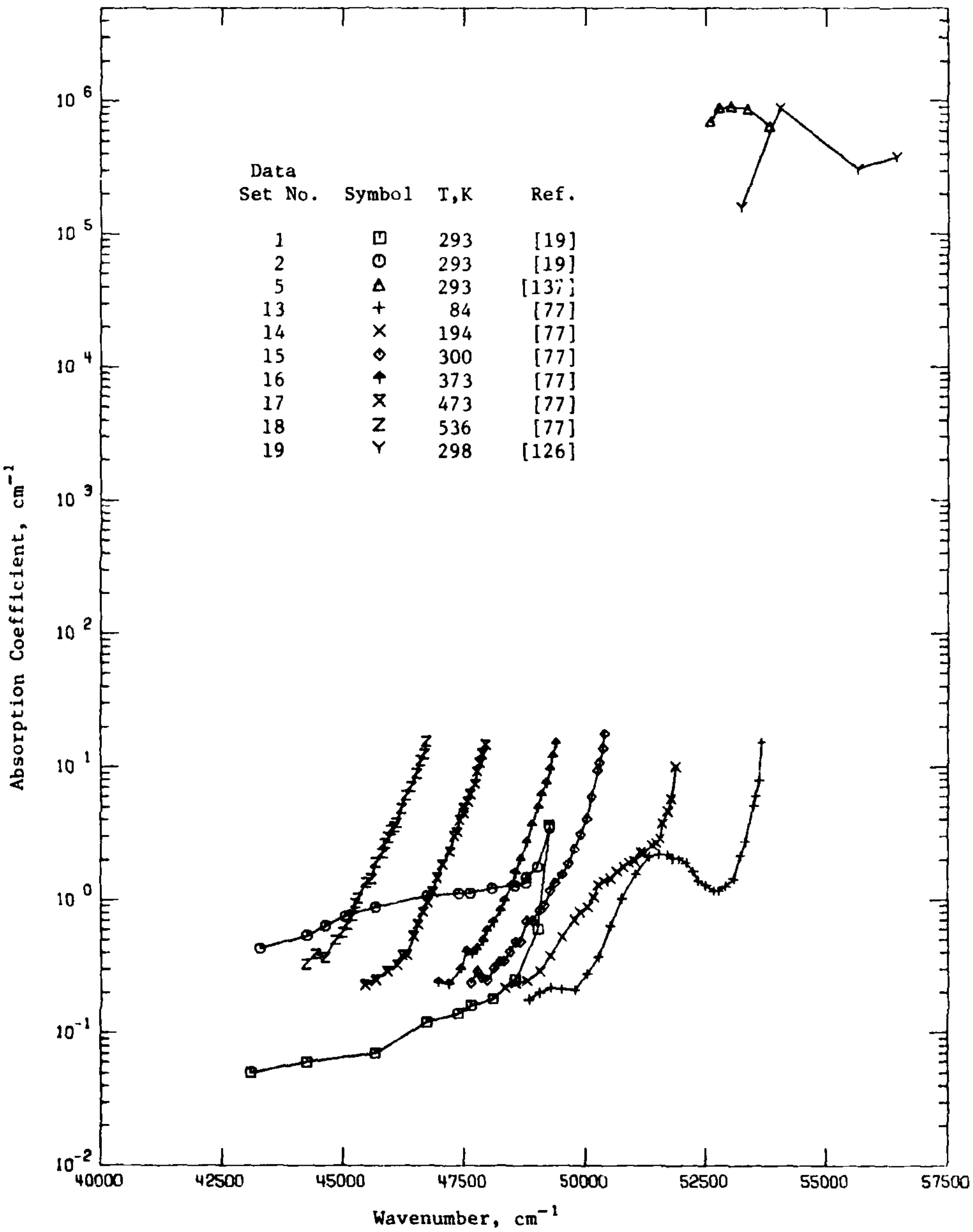

Figure 28. Absorption Coefficient of Potassium Bromide in the Urbach Tail Region

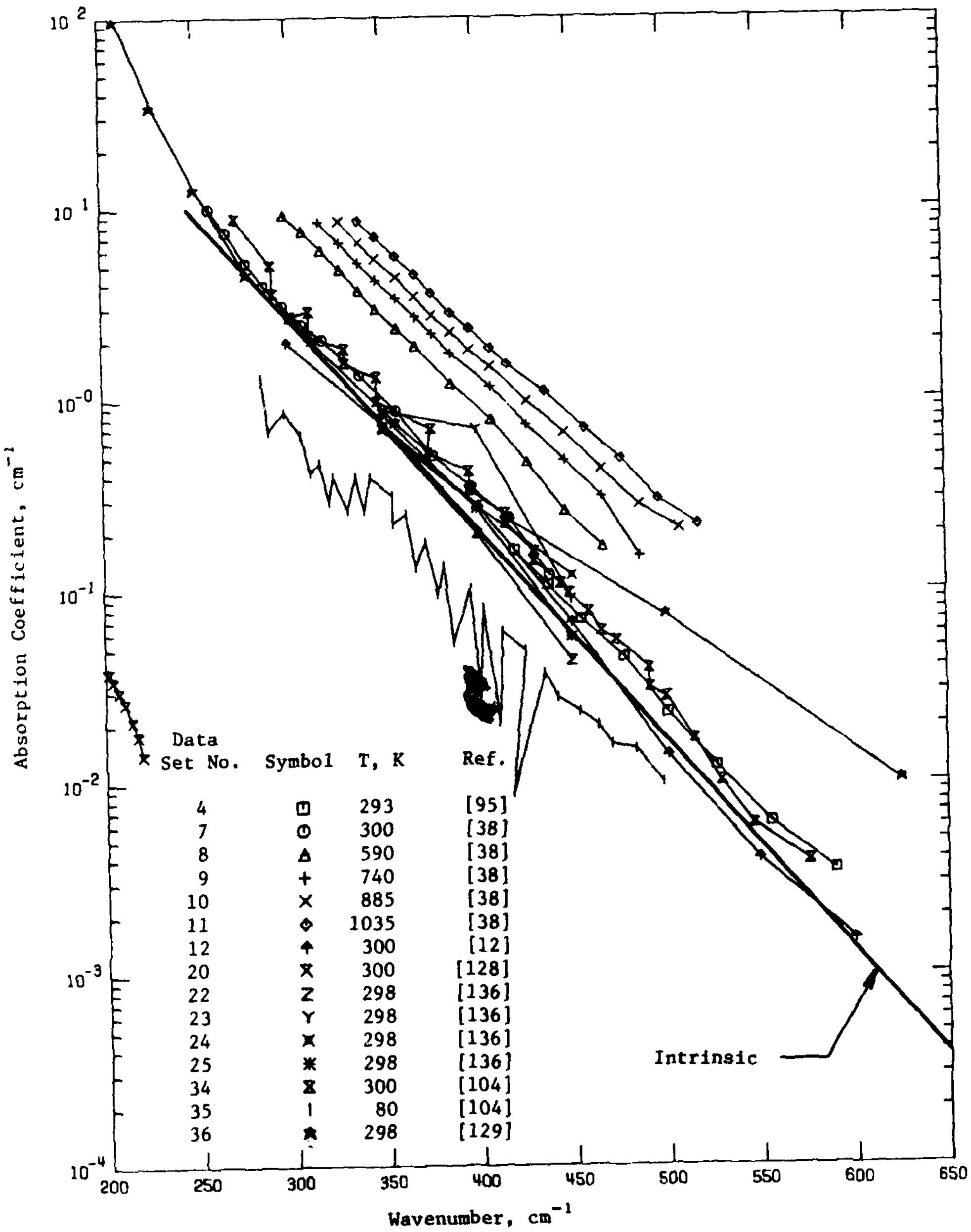

Figure 29. Absorption Coefficient of Potassium Bromide in the Multiphonon Region

TABLE 43. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM BROMIDE (Wavenumber Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	19	Hilsch, R. and Pohl, R.W.	1931	T	$3.98\times10^{4}-4.93\times10^{4}$	293	High purity; single crystal; grown from melt; absorption coefficients determined from transmission measurements; data extracted from a figure.
2	19	Hilsch, R. and Pohl, R.W.	1931	T	$4.32\times10^{4}-4.93\times10^{4}$	293	Similar to above except for a commercial crystal.
3	122	Antinori, M., Balzarotti, A., and Piacentini, M.	1973	R	$1.04\times10^{5}-1.65\times10^{5}$	293	Single crystal; obtained from the Harshaw Chemical Co.; specimen cleaved in air just before being mounted in the sample chamber to be vacuum pumped; reflection spectrum obtained with a monochromator of band width of 1.5 Å; spectra performed on the same specimen after 24 hours did not show significant changes and reproducible with uncertainty of about 5%; absorption coefficients derived by means of the Kramers-Kronig analysis on the reflection spectrum obtained from 13.5 to 20.5 eV, below 13.5 eV the reflection data of Rubloff were utilized while those of Blechschmidt et al. were used beyond 20.5 eV; absorption-coefficient data extracted from a figure.
4	95	Califano, S. and Czerny, M.	1958	[illegible]	$4.19\times10^{2}-5.9\times10^{2}$	293	Crystal; block specimens of 15.15 and 16.80 cm; absorption coefficients determined from transmittance measurements; data extracted from a figure.
5	137	Bauer, G.	1934	T	$5.26\times10^{4}-5.4\times10^{4}$	293	Crystal; thin film specimens of various thicknesses; absorption coefficients of bulk crystal deduced from transmittance and specimen thickness measurements; data extracted from a table.
6	123	Blechschmidt, D., Klucker, R., and Skibowski, M.	1969	R	$9.29\times10^{4}-2.42\times10^{5}$	293	Single crystal; provided by Karl Korth, Kiel, Germany; freshly cleaved specimen; absorption coefficients derived with the reflectivity versus angle of incidence method; data extracted from a figure.
7	38	Barker, A.J.	1972	R	$2.58\times10^{2}-4.38\times10^{2}$	300	Synthetic crystal; high purity; highly polished specimen of 1-2 mm thick; absorption coefficients deduced from reflectivity; data extracted from a figure.
8	38	Barker, A.J.	1972	R	$2.98\times10^{2}-4.67\times10^{2}$	590	Similar to above except at a higher temperature.
9	38	Barker, A.J.	1972	R	$3.17\times10^{2}-4.87\times10^{2}$	740	Similar to above except at a higher temperature.
10	38	Barker, A.J.	1972	R	$3.28\times10^{2}-5.08\times10^{2}$	885	Similar to above except at a higher temperature.
11	38	Barker, A.J.	1972	R	$3.38\times10^{2}-5.18\times10^{2}$	1035	Molten KBr specimen of 1-2 mm thick; reflectivity measurements carried out in a largely inert gas atmosphere; absorption coefficients deduced from reflection spectra; absorption-coefficient data extracted from a figure; melting temperature of KBr is 1003 K.

TABLE 43. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM BROMIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
12	12	Deutsch, T.F.	1973	T	$2.99\times10^{2}-6.0\times10^{2}$	300	Single crystal; obtained from Optovac Co.; specimen of 2.54 cm diameter and 2.54 cm thick; absorption coefficients determined using a differential technique with a dual-beam spectrophotometer; data extracted from a figure.
13	77	Tomiki, T., Miyata, T., and Tsukamoto, H.	1974	R	$4.88\times10^{4}-5.37\times10^{4}$	84	Single crystal; obtained from Harshaw Chemical Co.; absorption coefficients deduced from reflection measurements; data extracted from a figure.
14	77	Tomiki, T., et al.	1974	R	$4.83\times10^{4}-5.19\times10^{4}$	194	Similar to above except at a higher temperature.
15	77	Tomiki, T., et al.	1974	R	$4.76\times10^{4}-5.04\times10^{4}$	300	Similar to above except at a higher temperature.
16	77	Tomiki, T., et al.	1974	R	$4.69\times10^{4}-4.94\times10^{4}$	373	Similar to above except at a higher temperature.
17	77	Tomiki, T., et al.	1974	R	$4.54\times10^{4}-4.80\times10^{4}$	473	Similar to above except at a higher temperature.
18	77	Tomiki, T., et al.	1974	R	$4.42\times10^{4}-4.68\times10^{4}$	536	Similar to above except at a higher temperature.
19	126	Philipp, H.R. and Ehrenreich, H.	1963	R	$5.32\times10^{4}-1.94\times10^{5}$	298	Single crystal; near normal reflection spectrum obtained; absorption coefficients deduced by the Kramers-Kronig relations; absorption-coefficient data extracted from a figure.
20	128	Johnson, K. and Bell, E.	1969	R	20.7-220	300	Single crystal; well polished single surface; reflectivity and phase simultaneously measured by asymmetric Fourier transform spectroscopy and absorption coefficient deduced from the measurements; data extracted from a figure.
21	42	Owens, J.	1968	T	0.25-3.5	298	Single crystals; obtained from the Harshaw Chemical Co.; cylinder shaped specimen; filled resonant cavity method used for measuring dielectric constant and loss tangent; absorption coefficient then determined; data extracted from a figure.
22	136	Klein, P.H., Davison, J.W., and Harrington, J.A.	1976	C	350,400,450	298	High purity crystal; purified with reagent HBr; bar specimens; water ground followed by polishing with HBr solution; measured with laser calorimetry; data extracted from a table.
23	136	Klein, P.H. et al.	1976	C	350,400,450	298	Similar to above except purified with C_2Br_6 in the halide process.
24	136	Klein, P.H. et al.	1976	C	350,400,450	298	Similar to above except purified with C_6Br_6 in the halide process.
25	136	Klein, P.H. et al.	1976	C	350,400,450	298	Similar to above except purified with reagent CCl_4 in the halide process.
26	136	Klein, P.H. et al.	1976	C	943,9434	298	Similar to above except purified with reagent HBr in the halide process and concentration of hydroxyl ion 0.005 per million anion (ppm A).

TABLE 43. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM BROMIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
27	136	Klein, P.H., Davison, J.W., and Harrington, J.A.	1976	C	943,9434	298	Similar to above except purified with reagent C_2Br_6 in the halide process and concentration of hydroxyl ion 0.07 ppm A.
28	136	Klein, P.H. et al.	1976	C	943,2632,3704,9434	298	Similar to above except purified with reagent CCl_4 in the halide process and concentration of hydroxyl ion 0.05 ppm A.
29	136	Klein, P.H. et al.	1976	C	943,2632,3704,9434	298	Similar to above except concentration of hydroxyl ion <0.01 ppm A.
30	136	Klein, P.H. et al.	1976	C	926-1046	298	Above specimen; total absorption coefficients measured.
31	136	Klein, P.H. et al.	1976	C	926-1046	298	Above specimen; bulk absorption deduced from total absorption.
32	136	Klein, P.H. et al.	1976	C	926-1046	298	Similar to above specimen except concentration of hydroxyl ion 0.05 ppm A and total absorption measured.
33	119	Hass, M., Harrington, J.A., Gregory, D.A., and Davison, J.W.	1976	C	9434,3571,2632	298	Single crystal; highly purified and polished rod specimens; measured with laser calorimetric method; data extracted from a table; origins of higher absorption at 2.7 μm and 3.8 μm due to impurities in bulk material and surface contamination.
34	104	Harrington, J.A., Duthler, C.J., Patten, F.W., and Hass, M.	1976	C	272-576	300	Single crystal; obtained from the Harshaw Chemical Co.; experimental details not given; data extracted from a figure.
35	104	Harrington, J.A. et al.	1976	C	285-498	80	Same as above.
36	129	Mentzel, A.	1934	T	192-625	298	Single crystals; thin film and plate specimens of thickness from 43 μm to 13 mm; absorption coefficients determined from transmission measurements; data extracted from a table.
37	23	Genzel, L., Happ, H., and Weber, R.	1959	T	4.8-28	298	Crystal; plane parallel plate specimens of 2.5, 5.0, 38.5 mm thick; absorption coefficient determined based on transmission measurements; data extracted from a figure.
38	99	Rosenstock, H.B., Gregory, D.A., and Harrington, J.A.	1976	C	943.4,3703	298	Single crystals; obtained from the Naval Research Lab., the Harshaw Chemical Co., and the Raytheon Corp.; mechanically polished and chemically cleaned with spectrograde CCl_4; laser calorimetric method used; data extracted from a table; it was found that the surface absorption was about 45 times higher than the bulk absorption.
39	121	Rowe, J.M. and Harrington, J.A.	1976	C	926-1044	300	Single crystals; grown by the reactive-atmosphere-process; carefully polished surfaces; total absorption determined with laser calorimetric method; higher absorption occurred near 9.6 μm due to extrinsic contributions; data extracted from a figure.

TABLE 43. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM BROMIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
40	121	Rowe, J.M. and Harrington, J.A.	1976	C	926-1044	300	Same as above except the bulk absorption obtained.
41	121	Rowe, J.M. and Harrington, J.A.	1976	C	926-1044	300	Similar to above except for purer samples and bulk absorption obtained.

TABLE 44. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM BROMIDE (Wavenumber Dependence)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

ν	α
DATA SET 1	
T = 293.0	
4.926E+4	3.070E+0
4.902E+4	6.110E-1
4.894E+4	2.500E-1
4.838E+4	1.810E-1
4.702E+4	1.600E-1
4.733E+4	1.410E-1
4.673E+4	1.230E-1
4.566E+4	7.000E-2
4.425E+4	6.000E-2
4.310E+4	5.000E-2
3.984E+4	4.000E-2
DATA SET 2	
T = 293.0	
4.926E+4	3.910E+0
4.902E+4	1.790E+0
4.874E+4	1.470E+0
4.878E+4	1.340E+0
4.854E+4	1.270E+0
4.903E+4	1.220E+0
4.752E+4	1.120E+0
4.739E+4	1.120E+0
4.673E+4	1.070E+0
4.530E+4	9.300E-1
4.505E+4	7.500E-1
4.404E+4	6.400E-1
4.425E+4	5.430E-1
4.329E+4	4.300E-1
DATA SET 3	
T = 293.0	
1.649E+5	6.520E+5
1.639E+5	5.520E+5
1.631E+5	6.010E+5
1.627E+5	6.750E+5
1.623E+5	7.000E+5
1.613E+5	7.600E+5

ν	α
DATA SET 3(CONT.)	
1.624E+5	8.510E+5
1.615E+5	9.290E+5
1.611E+5	9.550E+5
1.601E+5	9.430E+5
1.591E+5	9.340E+5
1.588E+5	8.730E+5
1.583E+5	8.190E+5
1.573E+5	7.250E+5
1.567E+5	6.540E+5
1.550E+5	6.290E+5
1.552E+5	6.150E+5
1.533E+5	6.320E+5
1.519E+5	6.670E+5
1.503E+5	7.050E+5
1.478E+5	7.090E+5
1.469E+5	6.560E+5
1.460E+5	8.060E+5
1.449E+5	7.370E+5
1.439E+5	7.070E+5
1.420E+5	7.000E+5
1.415E+5	7.340E+5
1.393E+5	6.720E+5
1.383E+5	6.610E+5
1.377E+5	6.430E+5
1.367E+5	6.110E+5
1.356E+5	5.630E+5
1.347E+5	5.540E+5
1.340E+5	5.440E+5
1.327E+5	5.440E+5
1.315E+5	5.520E+5
1.307E+5	5.740E+5
1.293E+5	6.090E+5
1.281E+5	6.090E+5
1.254E+5	5.370E+5
1.243E+5	5.370E+5
1.223E+5	4.790E+5
1.210E+5	4.410E+5
1.199E+5	4.210E+5
1.185E+5	4.020E+5
1.164E+5	4.030E+5

ν	α
DATA SET 3(CONT.)	
1.150E+5	4.120E+5
1.140E+5	4.260E+5
1.133E+5	4.450E+5
1.126E+5	4.870E+5
1.115E+5	5.230E+5
1.107E+5	5.370E+5
1.094E+5	5.510E+5
1.085E+5	5.810E+5
1.076E+5	6.170E+5
1.068E+5	6.560E+5
1.059E+5	7.160E+5
1.048E+5	8.600E+5
DATA SET 4	
T = 293.0	
5.910E+2	3.462E-3
5.592E+2	6.183E-3
5.269E+2	1.225E-2
5.011E+2	2.292E-2
4.778E+2	4.509E-2
4.548E+2	7.066E-2
4.373E+2	1.071E-1
4.195E+2	1.629E-1
DATA SET 5	
T = 293.0	
5.382E+4	6.460E+5
5.336E+4	8.780E+5
5.312E+4	9.240E+5
5.277E+4	8.900E+5
5.261E+4	7.630E+5
DATA SET 6	
T = 293.0	
2.417E+5	6.287E+5
2.348E+5	7.139E+5
2.314E+5	7.967E+5

ν	α
DATA SET 6(CONT.)	
2.293E+5	8.672E+5
2.272E+5	9.043E+5
2.248E+5	8.928E+5
2.223E+5	8.407E+5
2.198E+5	8.039E+5
2.156E+5	7.859E+5
2.123E+5	7.978E+5
2.114E+5	8.391E+5
2.083E+5	8.612E+5
2.047E+5	8.822E+5
1.994E+5	8.593E+5
1.926E+5	8.131E+5
1.895E+5	7.792E+5
1.838E+5	7.599E+5
1.778E+5	7.620E+5
1.725E+5	8.811E+5
1.717E+5	1.074E+6
1.710E+5	1.117E+6
1.692E+5	1.069E+6
1.660E+5	7.426E+5
1.638E+5	6.936E+5
1.614E+5	7.016E+5
1.593E+5	8.666E+5
1.571E+5	7.541E+5
1.560E+5	6.942E+5
1.541E+5	6.567E+5
1.503E+5	6.035E+5
1.489E+5	7.521E+5
1.403E+5	7.368E+5
1.423E+5	7.650E+5
1.390E+5	7.089E+5
1.362E+5	6.316E+5
1.332E+5	5.592E+5
1.277E+5	5.406E+5
1.254E+5	4.932E+5
1.231E+5	4.269E+5
1.202E+5	3.745E+5
1.167E+5	3.813E+5
1.111E+5	4.762E+5
1.025E+5	7.316E+5

ν	α
DATA SET 6(CCNT.)	
9.919E+4	8.401E+5
9.645E+4	9.879E+5
9.290E+4	1.401E+6
DATA SET 7	
T = 300.0	
4.380E+2	1.200E-1
4.170E+2	2.400E-1
3.970E+2	3.500E-1
3.770E+2	5.100E-1
3.570E+2	8.800E-1
3.380E+2	1.350E+0
3.130E+2	2.070E+0
3.070E+2	2.480E+0
2.970E+2	3.130E+0
2.870E+2	3.990E+0
2.780E+2	5.250E+0
2.670E+2	7.560E+0
2.580E+2	9.970E+0
DATA SET 8	
T = 590.0	
4.670E+2	1.700E-1
4.470E+2	2.600E-1
4.270E+2	4.700E-1
4.080E+2	7.900E-1
3.970E+2	1.210E+0
3.680E+2	1.910E+0
3.580E+2	2.300E+0
3.470E+2	2.960E+0
3.380E+2	3.730E+0
3.280E+2	4.760E+0
3.180E+2	6.090E+0
3.080E+2	7.610E+0
2.980E+2	9.320E+0

ν	α
DATA SET 9	
T = 740.0	
4.870E+2	1.530E-1
4.670E+2	3.100E-1
4.470E+2	4.800E-1
4.270E+2	7.400E-1
4.080E+2	1.170E+0
3.970E+2	1.740E+0
3.770E+2	2.190E+0
3.630E+2	2.710E+0
3.530E+2	3.400E+0
3.470E+2	4.190E+0
3.350E+2	5.210E+0
3.280E+2	6.500E+0
3.170E+2	8.540E+0
DATA SET 10	
T = [illegible]	
5.050E+2	2.100E-1
4.870E+2	2.800E-1
4.670E+2	4.300E-1
4.470E+2	6.700E-1
4.270E+2	9.300E-1
4.050E+2	1.450E+0
3.970E+2	1.800E+0
3.870E+2	2.250E+0
3.770E+2	2.740E+0
3.630E+2	3.450E+0
3.580E+2	4.370E+0
3.470E+2	5.430E+0
3.380E+2	6.570E+0
3.230E+2	8.540E+0
DATA SET 11	
T = 1035.0	
5.180E+2	2.260E-1
4.970E+2	3.000E-1
4.770E+2	4.900E-1
4.580E+2	7.000E-1

TABLE 44. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM BROMIDE (Wavenumber Dependence) (continued)

DATA SET 11(CONT.)

ν	α
4.376E+2	1.19[illegible]
4.27[illegible]E+2	1.52[illegible]
[illegible]E+2	1.35[illegible]
3.97[illegible]E+2	2.33[illegible]
3.87[illegible]E+2	2.83[illegible]
3.77[illegible]E+2	3.35[illegible]E+0
3.68[illegible]E+2	4.5[illegible]
3.58[illegible]E+2	5.63[illegible]E+0
3.47[illegible]E+2	7.11[illegible]E+0
3.38[illegible]E+2	8.65[illegible]E+0

DATA SET 12
T = 3[illegible]

ν	α
5.999E+2	1.5[illegible]E-3
5.491E+2	4.[illegible]E-3
5.010E+2	1.[illegible]E-2
4.5[illegible]E+2	1.5[illegible]E-2
4.[illegible]E+2	[illegible].773E-[illegible]
2.[illegible]E+2	[illegible]

DATA SET 13
T = 8[illegible]

ν	α
5.365E+4	1.524E+1
5.3[illegible]E+4	7.9[illegible]E+0
5.352E+4	6.1[illegible]E+0
5.345E+4	5.123E+0
5.331E+4	2.754E+0
5.321E+4	2.159E+0
[illegible]9E+4	1.432E+[illegible]
5.[illegible]1E+4	1.247E+0
5.277E+4	1.10[illegible]E+0
5.267E+4	1.1[illegible]E+0
5.25[illegible]E+4	1.29[illegible]E+0
5.234E+4	1.347E+0
5.224E+4	1.637E+0
5.210E+4	1.935E+0
5.194E+4	2.051E+0
5.182E+4	2.301E+0

DATA SET 13(CONT.)

ν	α
5.170E+4	2.188E+0
5.152E+4	2.189E+0
5.131E+4	2.118E+0
5.104E+4	1.563E+0
5.075E+4	1.023E+0
5.051E+4	6.358E-1
5.020E+4	3.598E-1
5.002E+4	2.786E-1
4.977E+4	2.[illegible]E-1
4.949E+4	2.128E-1
4.927E+4	2.198E-1
4.[illegible]E+4	2.0[illegible]E-1
4.382E+4	1.778E-1

DATA SET 14
T = 194.0

ν	α
5.193E+4	1.[illegible]E-1
5.178E+4	5.75[illegible]E+0
5.[illegible]71E+4	4.03[illegible]E+0
5.163E+4	3.707E+0
5.155E+4	2.871E+0
5.147E+4	2.679E+0
5.138E+4	2.576E+0
5.121E+4	2.276E+0
5.113E+4	2.24[illegible]E+0
5.102E+4	1.959E+0
5.09[illegible]E+4	1.9[illegible]5E+0
5.073E+4	1.77[illegible]E+0
5.065E+4	1.637E+0
5.052E+4	1.445E+0
5.033E+4	1.390E+0
5.020E+4	1.3[illegible]E+0
5.017E+4	1.047E+0
5.004E+4	8.831E-1
4.985E+4	8.054E-1
4.977E+4	7.347E-1
4.951E+4	5.272E-1
4.927E+4	3.842E-1
4.905E+4	2.897E-1

DATA SET 14(CONT.)

ν	α
4.879E+4	2.466E-1
4.856E+4	2.344E-1
4.833E+4	2.178E-1

DATA SET 15
T = 3[illegible]

ν	α
5.040E+4	1.770E+1
5.036E+4	1.374E+1
5.029E+4	1.076E+1
5.025E+4	9.462E+0
5.012E+4	5.398E+0
5.002E+4	4.074E+0
4.990E+4	3.105E+0
4.976E+4	2.338E+0
4.965E+4	1.871E+0
4.952E+4	1.563E+0
4.937E+4	1.337E+0
4.927E+4	1.175E+0
4.915E+4	9.162E-1
4.905E+4	8.318E-1
4.891E+4	6.950E-1
4.879E+4	6.950E-1
4.865E+4	4.853E-1
4.856E+4	4.853E-1
4.844E+4	4.036E-1
4.832E+4	3.436E-1
4.823E+4	3.436E-1
4.810E+4	3.076E-1
4.797E+4	2.489E-1
4.785E+4	2.618E-1
4.776E+4	2.897E-1
4.763E+4	2.366E-1

DATA SET 16
T = 373.0

ν	α
4.939E+4	1.514E+1
4.932E+4	1.208E+1
4.927E+4	9.683E+0

DATA SET 16(CONT.)

ν	α
4.918E+4	7.586E+0
4.909E+4	6.138E+0
4.902E+4	4.926E+0
4.890E+4	3.664E+0
4.879E+4	2.742E+0
4.860E+4	2.014E+0
4.850E+4	1.600E+0
4.848E+4	1.271E+0
4.833E+4	9.772E-1
4.824E+4	8.279E-1
4.810E+4	6.792E-1
4.796E+4	5.916E-1
4.788E+4	4.943E-1
4.776E+4	4.266E-1
4.766E+4	3.926E-1
4.754E+4	4.130E-1
4.742E+4	3.[illegible]34E-1
4.718E+4	2.344E-1
4.696E+4	2.410E-1

DATA SET 17
T = 473.0

ν	α
4.794E+4	1.472E+1
4.787E+4	1.247E+1
4.783E+4	1.067E+1
4.776E+4	9.162E+0
4.772E+4	7.579E+0
4.762E+4	6.194E+0
4.756E+4	5.495E+0
4.748E+4	4.926E+0
4.748E+4	4.508E+0
4.741E+4	3.981E+0
4.736E+4	3.236E+0
4.729E+4	3.034E+0
4.719E+4	2.301E+0
4.705E+4	1.837E+0
4.694E+4	1.459E+0
4.685E+4	1.148E+0
4.674E+4	9.550E-1

DATA SET 17(CONT.)

ν	α
4.664E+4	8.091E-1
4.654E+4	6.516E-1
4.644E+4	5.321E-1
4.631E+4	3.837E-1
4.621E+4	3.637E-1
4.610E+4	3.236E-1
4.590E+4	2.911E-1
4.567E+4	2.489E-1
4.544E+4	2.280E-1

DATA SET 18
T = 536.0

ν	α
4.672E+4	1.556E+1
4.667E+4	1.247E+1
4.659E+4	1.102E+1
4.651E+4	8.872E+0
4.640E+4	7.112E+0
4.629E+4	6.109E+0
4.619E+4	4.853E+0
4.611E+4	3.802E+0
4.606E+4	3.532E+0
4.599E+4	3.373E+0
4.593E+4	2.965E+0
4.585E+4	2.667E+0
4.581E+4	2.249E+0
4.567E+4	1.905E+0
4.558E+4	1.445E+0
4.548E+4	1.349E+0
4.531E+4	1.028E+0
4.525E+4	9.376E-1
4.519E+4	7.621E-1
4.508E+4	6.496E-1
4.499E+4	5.675E-1
4.485E+4	4.989E-1
4.463E+4	3.698E-1
4.444E+4	3.918E-1
4.423E+4	3.281E-1

DATA SET 19
T = 298.0

ν	α
1.935E+5	8.2[illegible]E+5
1.[illegible]47E+5	9.20[illegible]E+5
1.759E+5	9.2[illegible]E+5
1.75[illegible]E+5	[illegible]E+5
1.725E+5	9.[illegible]E+5
1.677E+5	1.16[illegible]E+6
1.653E+5	1.220E+6
1.637E+5	1.15[illegible]E+6
1.629E+5	1.02[illegible]E+6
1.[illegible]E+5	[illegible]E+5
1.591E+5	8.2[illegible]E+5
1.565E+5	7.80[illegible]E+5
1.532E+5	7.6[illegible]E+5
1.484E+5	9.0[illegible]E+5
1.46[illegible]E+5	9.6[illegible]E+5
1.435E+5	9.4[illegible]E+5
1.41[illegible]E+5	7.4[illegible]E+5
1.337E+5	6.7[illegible]E+5
1.331E+5	7.3[illegible]E+5
1.298E+5	6.[illegible]E+5
1.282E+5	8.[illegible]E+5
1.258E+5	7.2[illegible]E+5
1.234E+5	5.4[illegible]E+5
1.2[illegible]E+5	4.3[illegible]E+5
1.1[illegible]E+5	5.5[illegible]E+5
1.[illegible]5E+5	7.9[illegible]E+5
1.024E+5	8.6[illegible]E+5
9.919E+4	5.8[illegible]E+5
9.435E+4	1.32[illegible]E+6
8.79[illegible]E+4	8.4[illegible]E+5
8.[illegible]E+4	7.4[illegible]E+5
8.[illegible]5E+4	6.6[illegible]E+5
7.823E+4	5.4[illegible]E+5
7.415E+4	[illegible]E+5
7.097E+4	7.700E+5
6.935E+4	1.130E+6
6.654E+4	8.60[illegible]E+5
6.532E+4	5.100E+5
6.210E+4	3.9[illegible]E+5

TABLE 44. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM BROMIDE (Wavenumber Dependence) (continued)

DATA SET 19 (CONT.)

ν	α
5.908E+4	4.200E+5
5.806E+4	7.900E+5
5.645E+4	3.800E+5
5.565E+4	3.100E+5
5.463E+4	8.900E+5
5.323E+4	1.600E+5

DATA SET 20
T = 300.0

ν	α
2.197E+2	1.409E-2
2.169E+2	1.742E-2
2.143E+2	2.119E-2
2.101E+2	2.649E-2
2.069E+2	3.034E-2
2.039E+2	3.435E-2
2.013E+2	3.776E-2
1.991E+2	4.493E-2
1.976E+2	5.303E-2
1.974E+2	5.623E-2
1.896E+2	1.479E-1
1.875E+2	1.793E-1
1.849E+2	1.963E-1
1.808E+2	1.355E-2
1.771E+2	2.244E-1
1.750E+2	2.465E-1
1.741E+2	2.692E-1
1.727E+2	3.329E-1
1.717E+2	4.199E-1
1.695E+2	4.477E-1
1.664E+2	4.532E-1
1.621E+2	4.592E-1
1.602E+2	4.699E-1
1.579E+2	4.842E-1
1.463E+2	5.222E-1
1.291E+2	1.799E+0
1.175E+2	3.936E+0
1.141E+2	4.819E+0
1.130E+2	5.249E+0
1.114E+2	5.175E+0

DATA SET 20 (CONT.)

ν	α
1.104E+2	4.955E+0
1.103E+2	2.594E+0
1.078E+2	1.205E+0
1.043E+2	6.281E-1
8.960E+1	1.945E-1
8.770E+1	1.400E-1
8.540E+1	1.318E-1
8.040E+1	1.211E-1
7.480E+1	1.148E-1
7.020E+1	1.132E-1
6.160E+1	1.107E-1
5.510E+1	1.040E-1
5.130E+1	9.661E-2
4.350E+1	7.889E-2
3.600E+1	5.848E-2
2.070E+1	1.774E-2

DATA SET 21
T = 298.0

ν	α
3.483E+0	2.716E-4
8.630E-1	5.058E-4
2.594E-1	1.175E-3

DATA SET 22
T = 298.0

ν	α
4.500E+2	4.300E-2
4.000E+2	2.000E-1
3.500E+2	7.200E-1

DATA SET 23
T = 298.0

ν	α
4.500E+2	9.000E-2
4.000E+2	7.000E-1
3.500E+2	8.800E-1

DATA SET 24
T = 298.0

ν	α
4.500E+2	1.200E-1
4.000E+2	2.800E-1
3.500E+2	7.000E-1

DATA SET 25
T = 298.0

ν	α
4.500E+2	5.700E-2
4.000E+2	2.700E-1
3.500E+2	8.400E-1

DATA SET 26
T = 298.0

ν	α
9.434E+3	2.000E-5
9.434E+2	2.000E-4

DATA SET 27
T = 298.0

ν	α
9.434E+3	3.000E-5
9.434E+2	2.000E-4

DATA SET 28
T = 298.0

ν	α
9.434E+3	5.000E-6
3.704E+3	1.200E-4
2.632E+3	1.700E-4
9.434E+2	6.000E-5

DATA SET 29
T = 298.0

ν	α
9.434E+3	3.000E-6
3.704E+3	1.200E-4
2.632E+3	2.200E-4
9.434E+2	1.460E-5

DATA SET 30
T = 298.0

ν	α
1.046E+3	1.080E-4
1.035E+3	1.200E-4
1.035E+3	1.000E-4
9.834E+2	6.870E-5
9.709E+2	6.060E-5
9.524E+2	6.740E-5
9.524E+2	6.140E-5
9.434E+2	6.010E-5
9.434E+2	5.350E-5
9.259E+2	5.080E-5

DATA SET 31
T = 298.0

ν	α
1.046E+3	3.390E-5
1.035E+3	2.700E-5
9.834E+2	2.200E-5
9.709E+2	1.510E-5
9.524E+2	2.870E-5
9.524E+2	2.620E-5
9.434E+2	2.010E-5
9.434E+2	1.840E-5
9.434E+2	1.280E-5
9.434E+2	6.590E-6
9.259E+2	1.840E-5

DATA SET 32
T = 298.0

ν	α
1.046E+3	2.210E-4
1.035E+3	2.290E-4
9.834E+2	1.030E-4
9.709E+2	9.280E-5
9.524E+2	8.880E-5
9.434E+2	1.030E-4
9.434E+2	8.780E-5
9.259E+2	1.020E-4

DATA SET 33
T = 298.0

ν	α
9.434E+3	3.000E-6
3.704E+3	1.200E-4
2.632E+3	2.200E-4

DATA SET 34
T = 300.0

ν	α
2.720E+2	8.950E+0
2.910E+2	5.080E+0
2.920E+2	3.610E+0
3.010E+2	2.720E+0
3.110E+2	2.899E+0
3.120E+2	2.170E+0
3.300E+2	1.840E+0
3.300E+2	1.550E+0
3.470E+2	1.310E+0
3.470E+2	9.850E-1
3.760E+2	7.030E-1
3.740E+2	5.290E-1
3.960E+2	4.220E-1
3.960E+2	3.360E-1
4.150E+2	2.540E-1
4.150E+2	2.270E-1
4.200E+2	1.610E-1
4.300E+2	1.440E-1
4.440E+2	1.090E-1
4.490E+2	9.700E-2
4.590E+2	7.730E-2
4.660E+2	6.170E-2
4.740E+2	5.510E-2
4.910E+2	3.930E-2
4.910E+2	3.130E-2
5.010E+2	2.790E-2
5.150E+2	1.630E-2
5.290E+2	1.010E-2
5.460E+2	6.060E-3
5.760E+2	3.860E-3

DATA SET 35
T = 80.0

ν	α
2.950E+2	1.300E+0
2.990E+2	6.950E-1
2.970E+2	8.730E-1
3.060E+2	6.580E-1
3.110E+2	4.130E-1
3.160E+2	4.050E-1
3.210E+2	2.970E-1
3.230E+2	3.950E-1
3.310E+2	2.660E-1
3.350E+2	3.900E-1
3.400E+2	2.600E-1
3.430E+2	3.950E-1
3.550E+2	3.160E-1
3.550E+2	2.250E-1
3.620E+2	2.520E-1
3.670E+2	1.350E-1
3.710E+2	1.790E-1
3.790E+2	9.010E-2
3.920E+2	1.350E-1
3.970E+2	5.450E-2
3.950E+2	1.020E-1
4.010E+2	2.920E-2
4.030E+2	8.130E-2
4.110E+2	2.030E-2
4.130E+2	6.120E-2
4.250E+2	4.890E-2
4.180E+2	8.870E-3
4.350E+2	3.690E-2
4.420E+2	2.770E-2
4.540E+2	2.340E-2
4.640E+2	1.950E-2
4.710E+2	1.580E-2
4.840E+2	1.490E-2
4.980E+2	1.600E-2

DATA SET 36
T = 298.0

ν	α
6.250E+2	1.021E-2

TABLE 44. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM BROMIDE (Wavenumber Dependence) (continued)

ν	α
DATA SET 36(CONT.)	
5.000E+2	7.542E-2
4.167E+2	2.403E-1
3.571E+2	7.573E-1
3.125E+2	2.042E+0
2.778E+2	4.535E+0
2.500E+2	1.257E+1
2.273E+2	3.427E+1
2.083E+2	9.667E+1
1.923E+2	2.344E+2
DATA SET 37	
T = 296.0	
2.817E+1	1.083E+1
2.817E+1	1.093E+1
2.203E+1	5.453E+0
2.500E+1	7.791E+0
2.122E+1	4.273E+0
1.934E+1	3.390E+0
1.664E+1	2.644E+0
1.546E+1	2.292E+0
1.425E+1	1.852E+0
1.390E+1	1.531E+0
1.265E+1	1.263E+0
1.105E+1	8.903E-1
6.929E+0	3.550E-1
6.621E+0	3.422E-1
7.374E+0	2.444E-1
7.143E+0	2.493E-1
6.309E+0	1.561E-1
5.587E+0	1.209E-1
4.831E+0	5.499E-2
DATA SET 38	
T = 295.0	
9.434E+2	1.203E-4
3.704E+3	5.000E-5

ν	α
DATA SET 39	
T = 300.0	
9.259E+2	1.030E-4
9.434E+2	1.344E-4
9.434E+2	6.810E-5
9.524E+2	8.310E-5
9.709E+2	9.240E-5
9.804E+2	1.050E-4
1.033E+3	2.271E-4
1.044E+3	2.200E-4
DATA SET 40	
T = 300.0	
9.259E+2	5.710E-5
9.434E+2	5.460E-5
9.434E+2	5.990E-5
9.524E+2	6.270E-5
9.524E+2	6.730E-5
9.709E+2	6.390E-5
9.804E+2	6.890E-5
1.033E+3	1.000E-4
1.033E+3	1.220E-4
1.044E+3	1.100E-4
DATA SET 41	
T = 300.0	
9.259E+2	1.850E-5
9.434E+2	6.570E-5
9.434E+2	1.280E-5
9.434E+2	1.850E-5
9.434E+2	2.030E-5
9.524E+2	2.640E-5
9.524E+2	2.900E-5
9.709E+2	1.910E-5
9.804E+2	2.200E-5
1.033E+3	2.690E-5
1.044E+3	3.390E-5

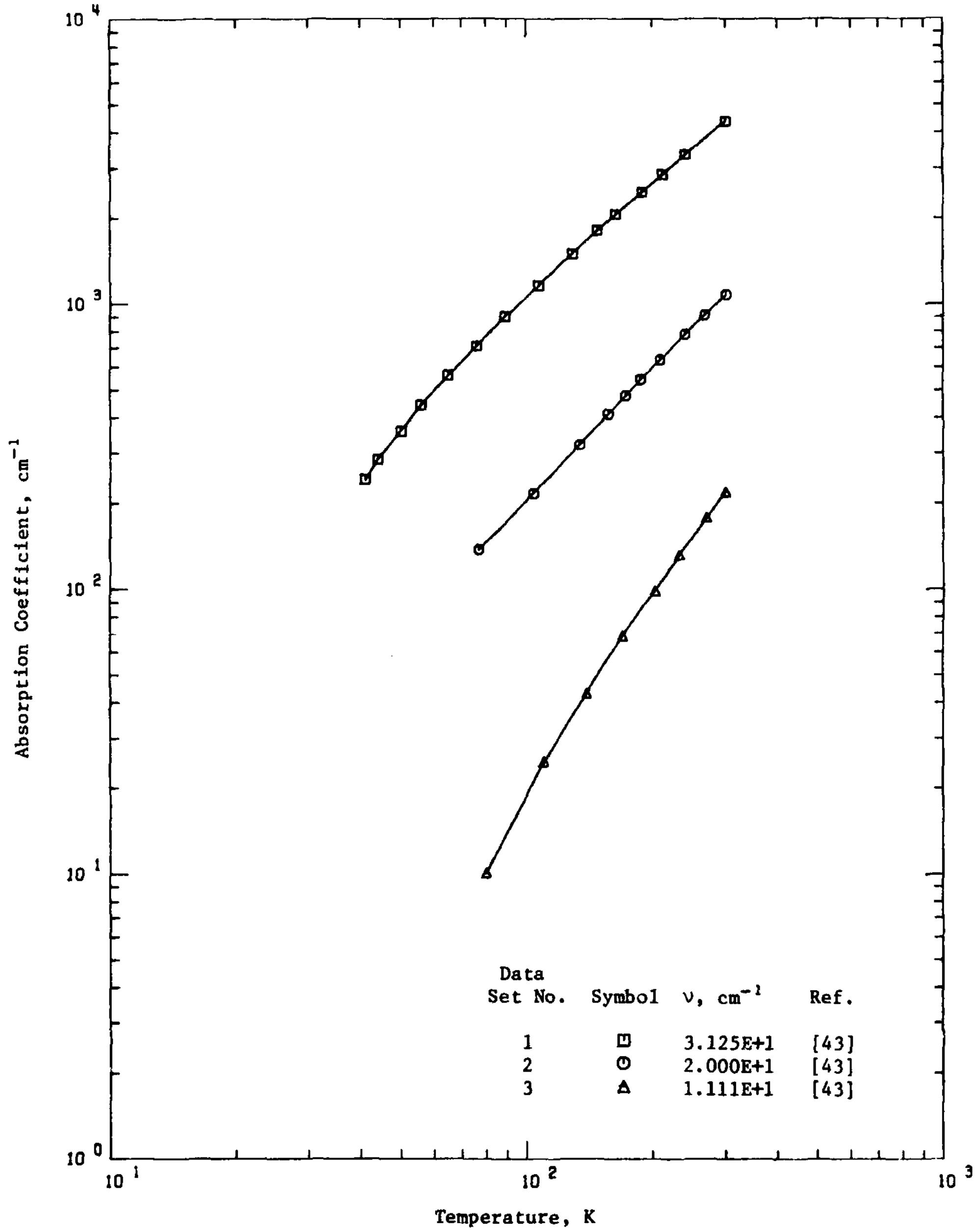

Figure 30. Absorption Coefficient of Potassium Bromide (Temperature Dependence)

TABLE 45. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM BROMIDE (Temperature Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	43	Stolen, R. and Dransfeld, K.	1965	T	31.25	41-300	High purity; single crystal; grown by the Bridgman Method; plate specimens of thickness 0.5 to 25.0 mm; absorption coefficients directly determined; data extracted from a figure.
2	43	Stolen, R. and Dransfeld, K.	1965	T	20.0	77-300	Same as above except for a longer wavelength.
3	43	Stolen, R. and Dransfeld, K.	1965	T	11.11	80-300	Same as above except for a longer wavelength.

TABLE 46. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM BROMIDE (Temperature Dependence)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

T	α
DATA SET 1	
ν = 3.125E+1	
41.0	2.419E+2
44.0	2.852E+2
50.0	3.584E+2
55.0	4.431E+2
65.0	5.628E+2
76.0	7.101E+2
99.0	9.044E+2
107.0	1.104E+3
129.0	1.509E+3
148.0	1.815E+3
164.0	2.071E+3
189.0	2.475E+3
212.0	2.854E+3
241.0	3.345E+3
300.0	4.385E+3
DATA SET 2	
ν = 2.000E+1	
77.0	1.369E+2
104.0	2.169E+2
134.0	3.213E+2
157.0	4.125E+2
173.0	4.783E+2
188.0	5.441E+2
209.0	6.373E+2
240.0	7.619E+2
267.0	9.151E+2
300.0	1.031E+3
DATA SET 3	
ν = 1.111E+1	
83.0	1.01[illegible]E+1
110.0	2.481E+1
139.0	4.323E+1
170.0	6.853E+1
203.0	9.869E+1
233.0	1.318E+2

T	α
DATA SET 3(CONT.)	
270.0	1.783E+2
300.0	2.190E+2

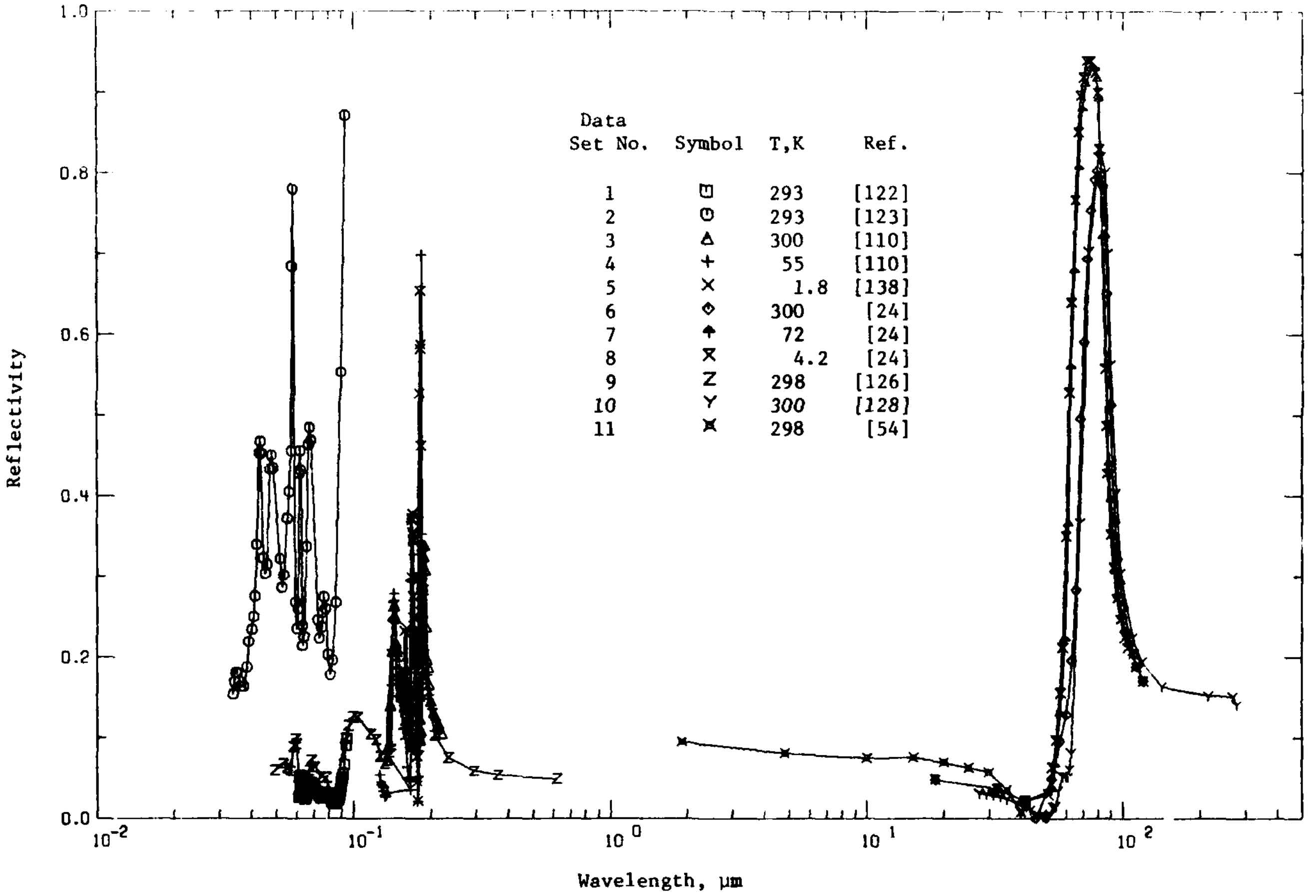

Figure 31. Reflectivity of Potassium Bromide

TABLE 47. SUMMARY OF MEASUREMENTS ON THE REFLECTIVITY OF POTASSIUM BROMIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, µm	Temperature, K	Specifications and Remarks
1	122	Antinori, M., Balzarotti, A., and Piacentini, M.	1973	R	0.06-0.094	293	Single crystal; obtained from the Harshaw Chemical Co.; specimen cleaved in air just before being mounted in the sample chamber to be vacuum pumped; reflection spectrum obtained with a monochromator of band width of 1.5 A; spectra performed on the same specimen after 24 hrs did not show significant changes and reproduced with uncertainty of about 5%; data extracted from a figure.
2	123	Blechschmidt, D., Klucker, R., and Skibowski, M.	1969	R	0.034-0.094	293	Single crystal; provided by Karl Korth, Kiel, Germany; freshly cleaved specimen; near normal reflectivity measured in vacuum for polarized light with normal of the specimen lying on both sides of the incident beam for increased accuracy; data extracted from a figure.
3	110	Baldini, G. and Basacchi, B.	1968	R	0.136-0.222	300	Single crystals specimen with cleaved surface; back surface of the specimen treated with an emery cloth to reduce the reflection from the back; near normal reflectivity obtained with specimen in vacuum; data extracted from a figure.
4	110	Baldini, G. and Bosacchi, B.	1968	R	0.127-0.214	55	Same as above except at a low temperature.
5	138	Petroff, Y., Pinchaux, R., Chekroun, C., Balkanski, M., and Kamimura, H.	1971	R	0.155-0.188	1.8	Single crystal; specimen cleaved in liquid helium; near normal reflection spectrum obtained; data extracted from a curve.
6	24	Hadni, A., Claudel, J., Chanal, D., Strimer, P., and Vergnat, P.	1967	R	18.6-120	300	Single crystal; specimen of prism shape to avoid interference; near normal reflectivity obtained; data extracted from a curve.
7	24	Hadni, A. et al.	1967	R	18.6-120	72	Above specimen and conditions except at a lower temperature.
8	24	Hadni, A. et al.	1967	R	18.6-20	4.2	Above specimen and conditions except at a lower temperature.
9	126	Philipp, H.R. and Ehrenreich, H.	1963	R	0.049-0.62	298	Single crystal; near normal reflection spectrum obtained; data extracted from a curve.
10	128	Johnson, K. and Bell, E.	1969	R	27.4-278.5	300	Single crystal; well polished single surface; reflectivity measured by asymmetric Fourier-transform spectroscopy; data extracted from a figure.
11	54	McCarthy, D.E.	1963	R	1.9-40.0	298	Synthetic crystal; plate specimen of 5 cm thick; ground and polished to a flatness of seven fringes or better on both sides; incident angle 30°; data extracted from a figure.

TABLE 48. EXPERIMENTAL DATA ON THE REFLECTIVITY OF POTASSIUM BROMIDE

[Wavelength, λ, μm; Temperature, T, K; Reflectivity, ρ]

DATA SET 1
T = 293.0

λ	ρ
0.0613	0.0251
0.0615	0.0246
0.0617	0.0324
0.0619	0.0376
0.0620	0.0454
0.0621	0.0411
0.0623	0.0531
0.0624	0.0517
0.0625	0.0474
0.0629	0.0433
0.0631	0.0455
0.0632	0.0405
0.0633	0.0346
0.0637	0.0291
0.0639	0.0260
0.0641	0.0246
0.0644	0.0230
0.0647	0.0235
0.0651	0.0254
0.0656	0.0250
0.0662	0.0312
0.0669	0.0360
0.0672	0.0393
0.0676	0.0434
0.0681	0.0453
0.0682	0.0453
0.0687	0.0442
0.0695	0.0446
0.0708	0.0411
0.0714	0.0400
0.0710	0.0375
0.0715	0.0339
0.0724	0.0329
0.0729	0.0310
0.0733	0.0299
0.0737	0.0268
0.0743	0.0249
0.0751	0.0246
0.0759	0.0258

DATA SET 1 (CONT.)

λ	ρ
0.0754	0.0275
0.0768	0.0315
0.0772	0.0328
0.0779	0.0311
0.0782	0.0298
0.0791	0.0266
0.0795	0.0251
0.0805	0.0265
0.0811	0.0244
0.0816	0.0227
0.0822	0.0212
0.0828	0.0189
0.0837	0.0179
0.0847	0.0179
0.0857	0.0192
0.0865	0.0211
0.0872	0.0232
0.0877	0.0261
0.0880	0.0291
0.0884	0.0321
0.0888	0.0371
0.0892	0.0419
0.0895	0.0455
0.0899	0.0489
0.0909	0.0521
0.0913	0.0655
0.0922	0.0874
0.0930	0.0968
0.0942	0.1000

DATA SET 2
T = 293.0

λ	ρ
0.0340	0.154
0.0345	0.169
0.0349	0.181
0.0353	0.181
0.0359	0.170
0.0363	0.164
0.0373	0.164

DATA SET 2 (CONT.)

λ	ρ
0.0384	0.137
0.0392	0.219
0.0402	0.234
0.0409	0.250
0.0414	0.275
0.0420	0.339
0.0430	0.453
0.0433	0.467
0.0436	0.453
0.0446	0.322
0.0453	0.313
0.0459	0.314
0.0474	0.433
0.0479	0.450
0.0487	0.434
0.0516	0.321
0.0523	0.296
0.0535	0.301
0.0554	0.372
0.0562	0.405
0.0572	0.455
0.0575	0.684
0.0579	0.780
0.0590	0.208
0.0603	0.235
0.0609	0.260
0.0615	0.428
0.0619	0.456
0.0623	0.432
0.0633	0.239
0.0637	0.214
0.0643	0.225
0.0658	0.337
0.0668	0.464
0.0675	0.485
0.0684	0.469
0.0727	0.240
0.0737	0.223
0.0752	0.237
0.0757	0.255

DATA SET 2 (CONT.)

λ	ρ
0.0768	0.274
0.0781	0.260
0.0799	[illegible]
0.0813	0.178
0.0831	0.196
0.0856	0.267
0.0894	0.553
0.0930	0.871

DATA SET 3
T = 300.0

λ	ρ
0.136	0.0719
0.137	0.0693
0.140	0.1330
0.142	0.2065
0.143	0.2459
0.144	[illegible]
0.145	0.2631
0.146	0.2472
0.147	0.2163
0.148	0.2099
0.151	0.2005
0.155	0.1500
0.158	0.1374
0.164	0.1657
0.166	0.0931
0.166	0.1389
0.168	0.0869
0.169	0.0955
0.171	0.1579
0.196	0.1852
0.173	0.2099
0.174	0.2318
0.177	0.1992
0.179	0.1549
0.181	0.1230
0.181	0.1064
0.182	0.0970
0.183	0.1079

DATA SET 3 (CONT.)

λ	ρ
0.186	0.1702
0.187	0.2454
0.188	0.3256
0.189	0.3331
0.190	0.3070
0.192	0.2366
0.194	0.1959
0.197	0.1652
0.200	0.1459
0.205	0.1312
0.214	0.1159
0.221	0.1049

DATA SET 4
T = 55.0

λ	ρ
0.127	0.0534
0.128	0.0450
0.129	0.0413
0.130	0.0391
0.131	0.0350
0.131	0.0339
0.132	0.0265
0.133	0.0272
0.134	0.0251
0.135	0.0318
0.137	0.0355
0.133	0.0709
0.138	0.0951
0.139	0.0897
0.140	0.0949
0.140	0.0910
0.142	0.1052
0.142	0.2035
0.143	0.2579
0.144	0.2756
[illegible]	0.2692
0.146	0.2136
0.147	0.187
0.147	0.1548

DATA SET 4 (CONT.)

λ	ρ
0.148	0.0510
0.150	0.0710
0.152	0.1507
0.156	0.1101
0.158	0.1112
0.159	0.0936
0.162	0.0634
0.164	0.0491
0.165	0.0466
0.166	0.0510
0.168	0.0887
0.168	0.1575
0.170	0.2931
0.171	0.3260
0.172	0.2965
0.175	0.1273
0.176	0.0603
0.177	0.0461
0.178	0.0410
0.180	0.0517
0.181	0.1462
0.182	0.4667
0.183	0.0593
0.183	0.0984
0.185	0.3524
0.185	0.2965
0.187	0.2495
0.189	0.2035
0.193	0.1778
0.197	0.1531
0.202	0.1361
0.205	0.1227
0.214	0.1119

DATA SET 5
T = [illegible]

λ	ρ
0.155	0.165
0.155	0.161
0.156	0.157

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TABLE 48. EXPERIMENTAL DATA ON THE REFLECTIVITY OF POTASSIUM BROMIDE (continued)

λ	ρ
DATA SET 5(CONT.)	
0.155	0.161
0.157	0.174
0.157	0.180
0.158	0.177
0.158	0.232
0.159	0.145
0.160	0.132
0.161	0.121
0.161	0.235
0.162	0.110
0.162	0.111
0.163	0.120
0.164	0.116
0.165	0.110
0.165	0.114
0.165	0.125
0.167	0.130
0.167	0.133
0.168	0.193
0.168	0.273
0.169	0.378
0.169	0.370
0.172	0.354
0.174	0.346
0.171	0.331
0.172	0.344
0.172	0.275
0.172	0.249
0.172	0.191
0.175	0.165
0.175	0.197
0.177	0.177
0.177	0.146
0.178	0.122
0.179	0.104
0.179	0.297
0.180	0.527
0.181	0.542
0.181	0.555
0.181	0.654

λ	ρ
DATA SET 5(CONT.)	
0.183	0.462
0.183	0.336
0.184	0.290
0.184	0.255
0.185	0.234
0.186	0.202
0.187	0.175
DATA SET 6	
T = 300.0	
18.6	0.048
32.3	0.037
41.5	0.022
45.5	0.020
52.9	0.049
56.5	0.098
60.2	0.129
63.1	0.190
65.7	0.293
67.5	0.496
70.1	0.591
72.6	0.694
74.9	0.754
77.7	0.792
79.2	0.803
81.8	0.798
83.4	0.784
85.2	0.722
86.7	0.551
89.2	0.513
90.3	0.435
93.2	0.308
95.4	0.322
97.5	0.292
101.2	0.262
105.0	0.229
110.1	0.214
113.3	0.198
120.0	0.179

λ	ρ
DATA SET 7	
T = 72.0	
18.6	0.048
32.3	0.037
41.5	0.022
52.7	0.035
54.3	0.065
56.9	0.129
59.3	0.221
61.3	0.364
62.5	0.559
64.5	0.673
67.0	0.806
69.1	0.878
72.2	0.909
74.5	0.928
77.6	0.928
79.2	0.915
80.3	0.893
83.3	0.720
85.2	0.459
89.6	0.394
91.5	0.349
94.0	0.335
96.4	0.275
99.3	0.243
101.9	0.232
106.0	0.215
113.3	0.168
120.0	0.170
DATA SET 8	
T = 4.2	
18.6	0.048
32.3	0.037
41.5	0.022
51.1	0.033
53.1	0.063
54.8	0.097
56.9	0.156

λ	ρ
DATA SET 8(CONT.)	
59.3	0.212
60.2	0.350
61.5	0.525
63.1	0.646
65.2	0.767
67.1	0.851
68.3	0.896
70.2	0.919
72.5	0.939
74.6	0.939
78.0	0.925
79.6	0.900
80.7	0.830
85.1	0.558
86.3	0.487
87.2	0.428
89.8	0.352
92.1	0.321
95.2	0.273
98.4	0.247
101.9	0.225
105.0	0.212
110.1	0.204
113.3	0.186
120.0	0.170
DATA SET 9	
T = 298.0	
0.0496	0.060
0.0534	0.068
0.0553	0.062
0.0571	0.059
0.0584	0.069
0.0596	0.099
0.0601	0.093
0.0613	0.052
0.0629	0.043
0.0642	0.043
0.0659	0.047

λ	ρ
DATA SET 9(CONT.)	
0.0673	0.054
0.0688	0.073
0.0703	0.064
0.0747	0.051
0.0789	0.051
0.0865	0.029
0.0921	0.024
0.0949	0.032
0.0932	0.099
0.0961	0.115
0.1000	0.127
0.1042	0.120
0.1109	0.105
0.1227	0.093
0.1278	0.077
0.1323	0.058
0.1405	0.252
0.1494	0.181
0.1675	0.092
0.1746	0.102
0.1797	0.099
0.1878	0.283
0.1937	0.154
0.2066	0.133
0.2339	0.075
0.2952	0.059
0.3647	0.054
0.6200	0.049
DATA SET 10	
T = 300.0	
27.4	0.031
29.3	0.033
31.1	0.029
33.3	0.027
35.2	0.024
38.4	0.019
40.4	0.015
41.7	0.014

λ	ρ
DATA SET 10(CONT.)	
43.4	0.014
49.0	0.002
50.1	0.001
50.6	0.001
51.2	0.002
53.3	0.014
53.7	0.014
54.4	0.015
55.5	0.024
56.2	0.052
57.5	0.092
60.9	0.094
62.0	0.061
62.6	0.081
66.0	0.367
70.5	0.703
73.0	[illegible]
81.3	[illegible]
84.5	0.601
87.0	0.701
89.2	0.563
94.0	0.404
99.1	0.364
109.2	0.224
113.9	0.134
140.7	0.137
165.0	0.152
207.3	0.151
274.4	0.141
DATA SET 11	
T = 298.0	
1.9	0.035
4.8	0.051
10.0	0.075
15.2	0.076
20.0	0.070
25.0	0.063
29.9	0.057

TABLE 48. EXPERIMENTAL DATA ON THE REFLECTIVITY OF POTASSIUM BROMIDE (continued)

λ	ρ
DATA SET 11(CONT.)	
35.1	0.236
33.9	0.228

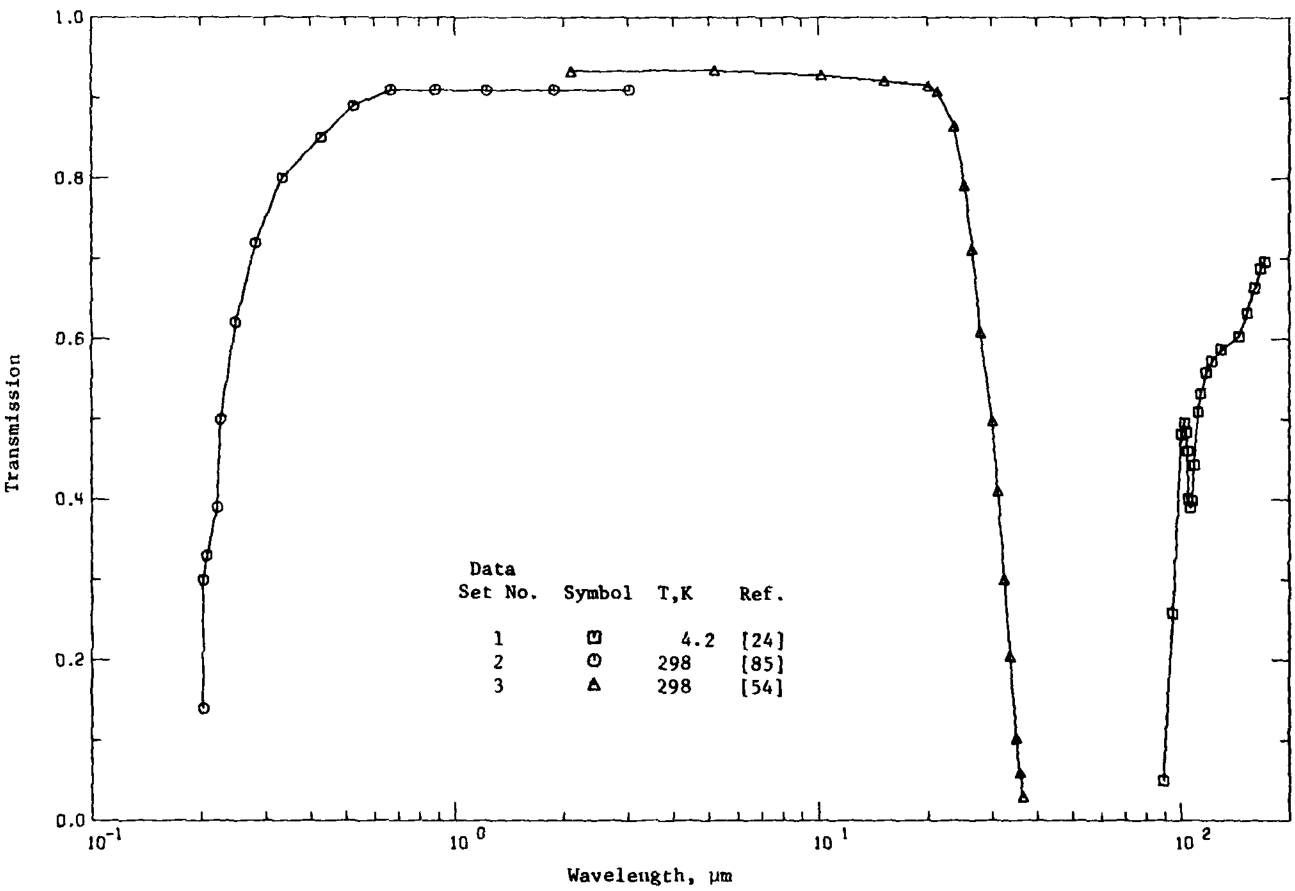

Figure 32. Transmission of Potassium Bromide

TABLE 49. SUMMARY OF MEASUREMENTS ON THE TRANSMISSION OF POTASSIUM BROMIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	24	Hadni, A., Claudel, J., Chanal, D., Strimer, P., and Vergnat, P.	1967	T	89.2-172.1	4.2	Single crystal; specimen of 2.5 mm thick; data extracted from a curve.
2	85	McCarthy, D.E.	1967	T	0.17-3.0	298	Synthetic crystal; plate specimen of 5.0 mm thick with surfaces parallel to within 0.001 mm/mm of length and flat to within 10 fringes or better of the mercury green line; measurements made on double-beam instruments with accuracy of ±2%; data extracted from a figure; temperature not given, 298 K assumed.
3	54	McCarthy, D.E.	1963	T	2.0-37.0	298	Synthetic crystal; plate specimen of 5 mm thick; ground and polished to a flatness of seven fringes or better on both sides; data taken from a figure.

TABLE 50. EXPERIMENTAL DATA ON THE TRANSMISSION OF POTASSIUM BROMIDE

[Wavelength, λ, μm; Temperature, T, K; Transmission, τ]

DATA SET 1
T = [illegible].2

λ	τ
69.2	0.049
95.1	[illegible] 238
[illegible]	[illegible]
[illegible]	0.49[illegible]
[illegible]	0.454
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	0.399
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
117.3	[illegible]
[illegible]	0.572
[illegible]	[illegible]
[illegible]	[illegible]
152.9	0.532
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	0.037

DATA SET 2
T = 30[illegible]

λ	τ
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
0.227	[illegible]
[illegible]	0.62
0.243	0.72
0.325	[illegible]
[illegible]	[illegible]
[illegible]	0.89
[illegible]	[illegible]
[illegible]	0.91
1.23	[illegible]
1.99	0.91
3.04	0.91

DATA SET 3
T = 298.[illegible]

λ	τ
2.[illegible]	0.933
5.2	0.934
[illegible]	0.928
[illegible]	[illegible]
[illegible]	0.915
21.3	0.906
23.7	0.865
25.3	0.791
26.6	0.71[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
32.5	[illegible]
33.[illegible]	0.205
35.1	0.112
35.3	0.059
36.7	0.029

TABLE 51. PEAK POSITIONS (λ_{max}) IN μm AND HALF-WIDTHS (W) IN eV FOR THE F, R, M, AND N ABSORPTION BANDS IN POTASSIUM BROMIDE*

Interionic dist., d (Å)	Temp.	F band λ_{max}	F band W	R_1 band λ_{max}	R_2 band λ_{max}	M band λ_{max}	M band W	N bands λ_{max}
3.29	RT	(0.630)†		(0.732)	(0.792)	(0.897)		
		0.625	0.35			0.917-0.918	0.12-0.13	1.080
		0.628	0.38					
		0.630	0.42					
		0.631						
	NT	0.599	0.19	0.735	0.790	0.887	0.06-0.07	
		0.601	0.20			0.892		
		0.603	0.22					
		0.607	0.30					
		0.608						
	HT	0.599	0.16			0.883-0.884	0.05	
		0.602	0.20					

* Values were taken from Ref. [69].

† Values given in parentheses are calculated from the Ivey relations [70].

F band $\lambda_{max} = 703\ d^{1.84}$ for NaCl structure, $\lambda_{max} = 251\ d^{2.5}$ for CsCl structure.

R_1 band $\lambda_{max} = 816\ d^{1.84}$

R_2 band $\lambda_{max} = 884\ d^{1.84}$

M band $\lambda_{max} = 1400\ d^{1.56}$

TABLE 52. RECOMMENDED VALUES ON ABSORPTION COEFFICIENT OF POTASSIUM BROMIDE IN IR REGION AT 300 K

ν, cm^{-1}	λ, μm	Absorption Coefficient, cm^{-1}	
		Intrinsic*	Observed† (Selected)
2.990E+02	33.4	2.9E+0	2.0E+0
3.000E+02	33.3	2.8E+0	
3.500E+02	28.6	7.8E-1	7.0E-1
4.000E+02	25.0	2.1E-1	2.0E-1
4.010E+02	24.9	2.1E-1	2.7E-1
4.500E+02	22.2	6.1E-2	1.8E-2
5.000E+02	20.0	1.6E-2	
5.010E+02	20.0	1.6E-2	1.3E-2
5.491E+02	18.2	4.8E-3	4.0E-3
6.000E+02	16.7	1.3E-3	1.5E-3
7.000E+02	14.3	1.0E-4	
8.000E+02	12.5	7.9E-6	
9.000E+02	11.1	6.1E-7	
9.259E+02	10.8	3.1E-7	1.8E-5(B), 5.6E-5(T)
9.434E+02	10.6	2.0E-7	1.4E-5(B), 5.6E-5(T)
9.524E+02	10.5	1.6E-7	2.7E-5(B), 6.4E-5(T)
9.709E+02	10.3	9.9E-8	1.5E-5(B), 6.0E-5(T)
9.804E+02	10.2	7.8E-8	2.2E-5(B), 6.8E-5(T)
1.000E+03	10.0	4.7E-8	
1.035E+03	9.66	1.9E-8	2.7E-5(B), 1.1E-4(T)
1.046E+03	9.56	1.4E-8	3.3E-5(B), 1.0E-4(T)
1.079E+03	9.27	6.2E-9	3.3E-5
2.632E+03	3.80	3.5E-26	1.7E-4
3.704E+03	2.70		1.2E-4
9.434E+03	1.06		3.0E-6

*Intrinsic values were calculated according to Eq. (35) with uncertainties about ±10%.

†Values in this column are the total absorption coefficient which are either lowest reported or those used to define the constants in Eq. (35). Uncertainties of these values are about ±10%. Values lower than 1.0E-3 carry higher uncertainties up to ±30%. Letters in the parentheses have the following meaning: B - bulk absorption and T - total absorption.

3.6. Potassium Iodide, KI

Potassium iodide is valuable as prism material, but it is too hygroscopic (being about twice as soluble in water as potassium bromide) and too soft for field use. It is also soluble in alcohol and in ammonia. Crystal ingots 19 cm in diameter are available. Although KI is one of the softest rock salt-structure alkali halides, thus not a suitable optical material, its wide transparency, 0.25 to 50 μm, draws considerable interest in research. Fundamental absorptions in the ultraviolet and infrared regions, as well as static and high-frequency dielectric constants have been measured by a number of investigators, and the results are reported in Table 2.

A reasonable quantity of data on the refractive index of KI are available in the open literature. By careful examination of the available data we find that for the transparent wavelength region the results of Gyulai [27] and Harting [30] are consistent (with temperature effects considered) to the fourth decimal place, in spite of the fact that Gyulai quoted an accuracy of one unit in the third decimal place. Korth's values [139], although being reported to the fourth decimal place, are good only to the third place. Data reported by Sprockhoff [140] and Topsöe and Christiansen [141] appear slightly too high at the assumed temperature; they either observed at a considerably lower temperature or used inadequate samples. In the infrared region, 40 μm and up, data were deduced by analyzing the information on reflection and transmission spectra. Data are available from the figures of Hadni et al. [24], Eldridge et al. [142], and Berg et al. [143].

Li [33] reduced the then available experimental data on the refractive index to a common temperature of 293 K and after careful critical evaluation and analysis adopted a Sellmeier type dispersion equation to evaluate the refractive index at 293 K in the transparent wavelength range 0.25–50 μm

$$n^2 = 1.47285 + \frac{0.16512\,\lambda^2}{\lambda^2-(0.129)^2} + \frac{0.41222\,\lambda^2}{\lambda^2-(0.175)^2} + \frac{0.44163\,\lambda^2}{\lambda^2-(0.187)^2} + \frac{0.16076\,\lambda^2}{\lambda^2-(0.219)^2} + \frac{0.33571\,\lambda^2}{\lambda^2-(69.44)^2} + \frac{1.92474\,\lambda^2}{\lambda^2-(98.04)^2} \quad (36)$$

where λ is in units of μm.

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Available data on the absorption coefficient, reflectivity, and transmission of KI compiled in the present work are given in Tables 53 and 60 and are plotted in Figures 33 to 38. Investigations of absorption coefficient for practical applications are generally classified into three wavelength regions: the ultraviolet and the infrared absorption edges and the transparent regions. In the case of KI, much of the absorption measurement was carried out in the vacuum uv region for the purposes of studying the band structure of the crystal. Many observations were performed in the far infrared region for study of the dielectric properties. Little information could be found in the transparent and absorption edge regions. In the uv absorption edge, early studies of the Urbach tail of KI were made by Martienssen [135] and Haupt [144]. Later, Tomiki et al. [77] studied the absorption of KI in the wavelength range between 0.200 and 0.280 μm for the purpose of determining the Urbach-rule parameters and finding the features characteristic of the intrinsic tail. Through a systematic observation and analysis, the following empirical relations of the parameters were found

$$
\begin{aligned}
E_o &= 5.890 \text{ eV} \\
\alpha_o &= 0.6 \times 10^{10} \text{ cm}^{-1} \\
hf &= 4.5 \text{ meV} \\
\sigma_{so} &= 0.830
\end{aligned}
$$

for the expression of absorption coefficient of the intrinsic tail

$$\alpha = \alpha_o \exp\,[-\sigma_s(T)(E_o - E)/kT] \tag{37}$$

where

$$\sigma_s(T) = \sigma_{so}\,\frac{2kT}{hf}\tanh\frac{hf}{2kT}$$

This equation represents the intrinsic absorption coefficient for pure KI crystals.

In the multiphonon absorption region, absorption coefficients on the high frequency side of the reststrahlen band were measured by Berg and Bell [143] based on transmission and reflection measurements using the method of asymmetric Fourier spectroscopy. Eldridge and Kembry [142] investigated the optical properties in the vicinity of reststrahlen band at various temperatures using a Fourier spectrometer for specimens of a range of thicknesses. Their results

agreed with those of Berg and Bell at corresponding temperature as shown in Figure 34 where the exponential relation between the variables are clearly seen. We found that the room temperature data can be represented by the relation

$$\alpha = \alpha_o e^{-\nu/\nu_o} \tag{38}$$

with ν_o = 36 cm^{-1} and α_o = 3458 cm^{-1}. Detailed discussion of this finding is given in the section entitled "Summary of Results and Recommendations".

We have seen that the intrinsic absorption coefficients of KI in the Urbach and multiphonon regions, respectively, obey the exponential law. It is not known if the two relations hold for the transparent region. If they did, absorption in the transparent region would be negligible. However, at the color centers (given in Table 61), possible absorptions should be considered. The intensity of absorption depends on the purity, thermal and irradiation history of the sample, and its physical environment. As the color centers may be bleached as well as created by appropriate thermal and/or radiation energy, absorption at these bands varies considerably. As a result, no definite values can be assigned other than the spectral positions of these bands.

Figures 33 to 36 are plots of the available data. The pertinent information of each data source and the corresponding original values are given in Tables 53 to 56. In addition, available information and data on the reflectivity and transmission are also presented in the same manner (in Figures 37 and 38 and Tables 57 and 60), for completeness and comparison. For the visible and near visible regions, Table 61 gives the spectral positions of the well known color centers.

Recommended values given in Table 62 were calculated from Eq. (38). It should be noted that the values in the "intrinsic" column are the lowest limits that one can obtain for ideal samples. In practice, the observed values are generally higher than the limiting values at low absorption levels. Unless values appear in the "observed" column, the limiting values are considered as guidelines for estimation and investigation.

Although it was not within the scope of this study to compile and evaluate the absorption data in the vacuum ultraviolet region, in order to provide the reader a total picture of the available absorption data of KI, a plot of selected data sets in the uv region is given in the Appendix to this report.

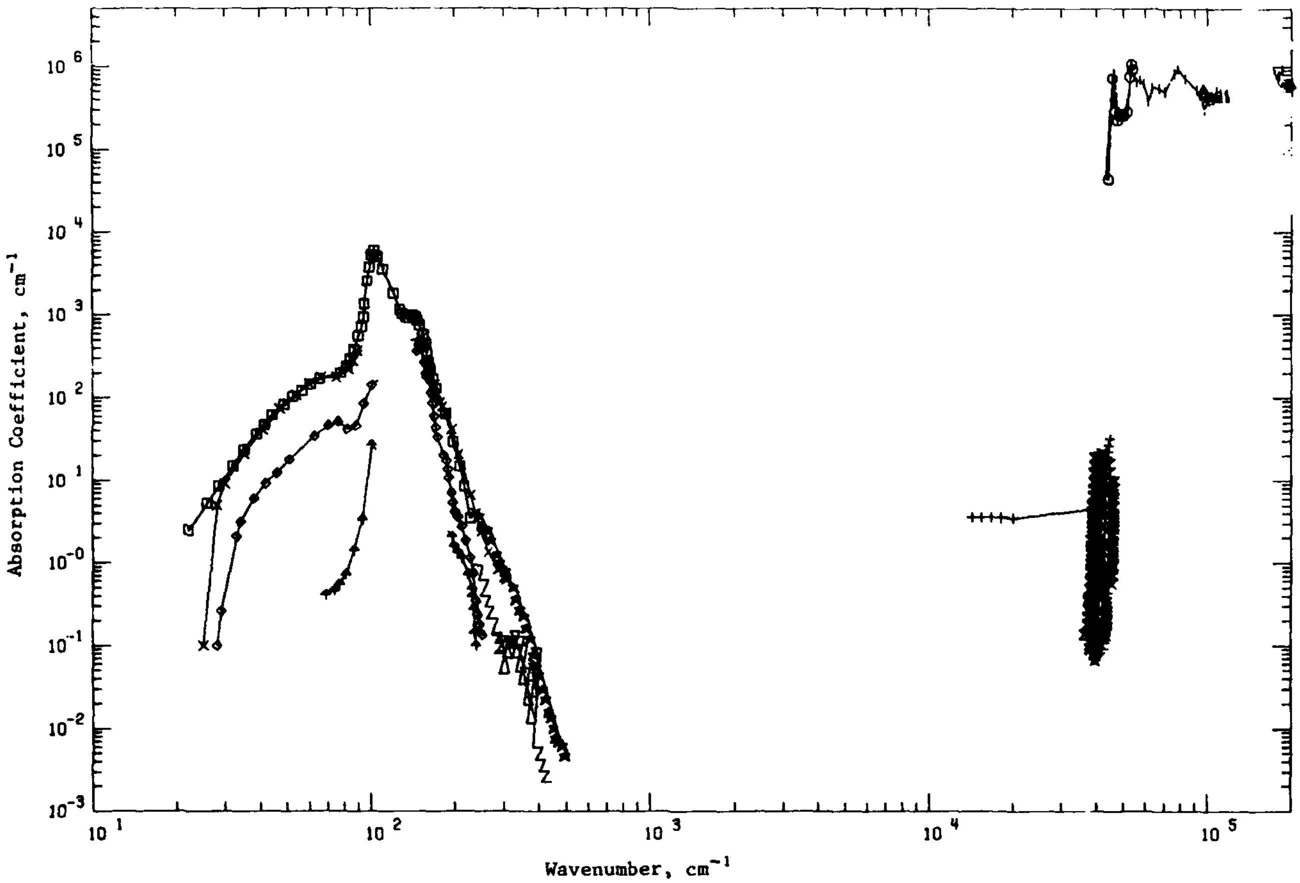

Figure 33. *Absorption Coefficient of Potassium Iodide (Wavenumber Dependence)*

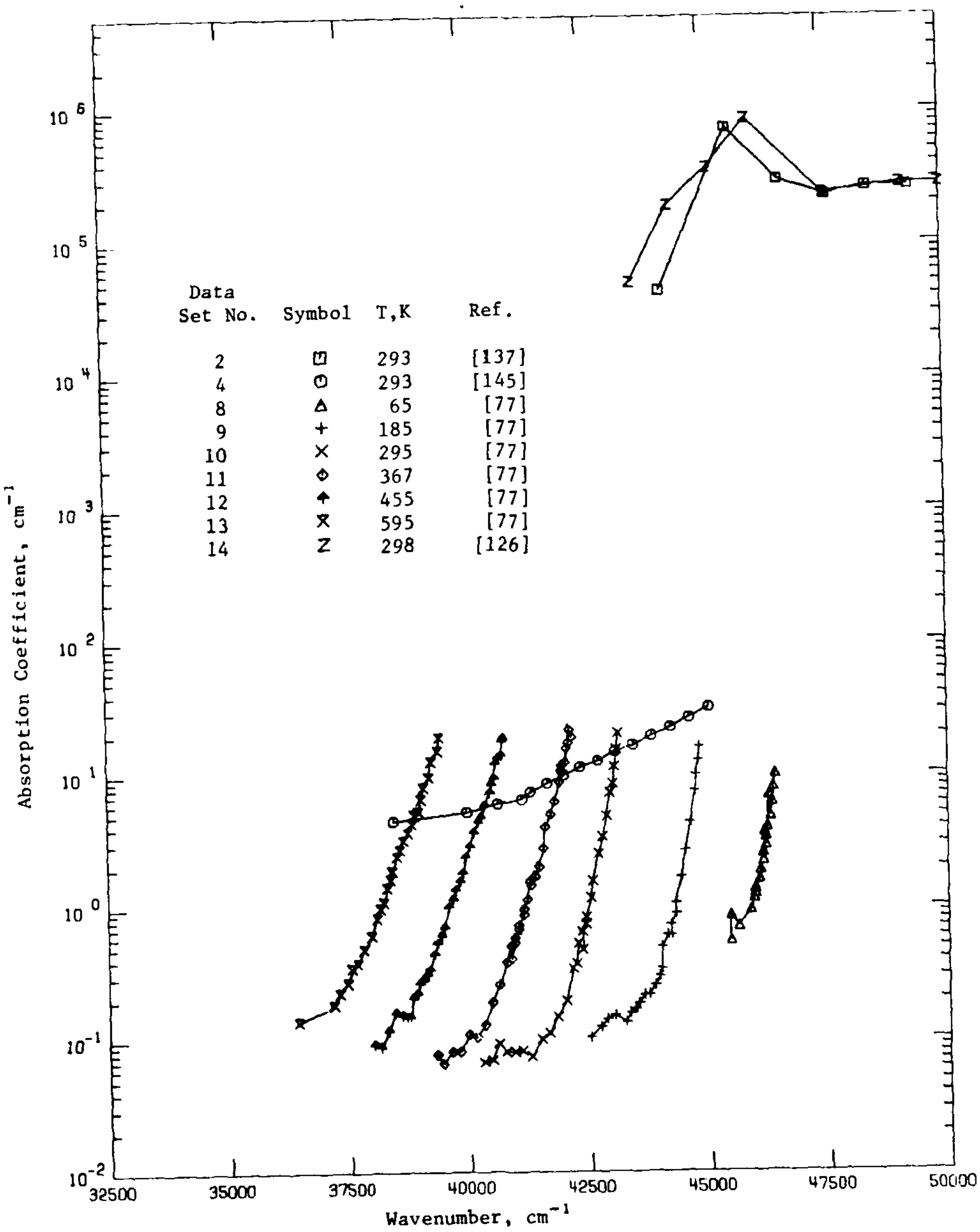

Figure 34. Absorption Coefficient of Potassium Iodide in the Urbach Tail Region

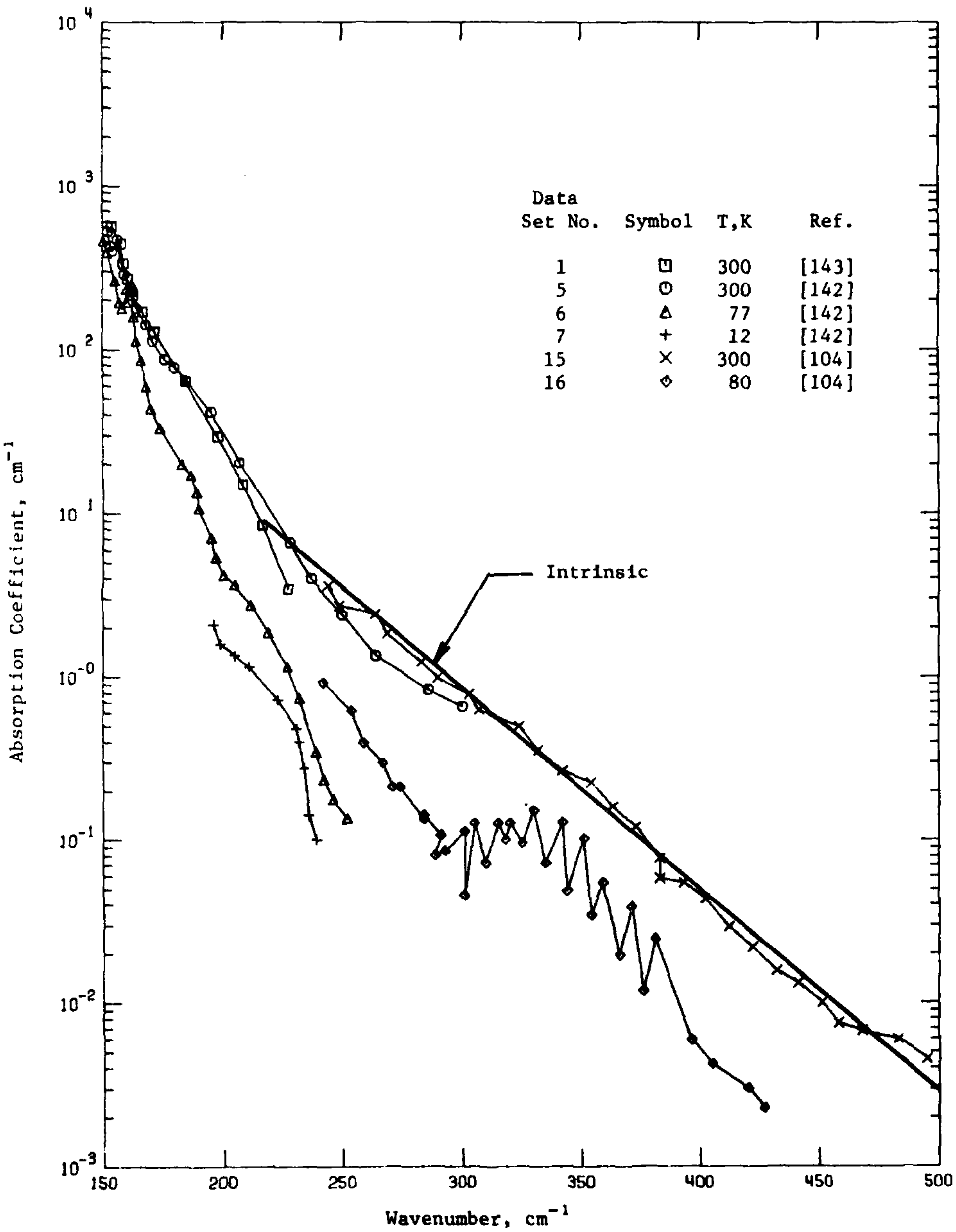

Figure 35. Absorption Coefficient of Potassium Iodide in the Multiphonon Region

TABLE 53. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM IODIDE (Wavenumber Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	143	Berg, J.I. and Bell, E.E.	1971	Z	$2.2\times10^{1}-2.28\times10^{2}$	300	Crystal; obtained from the Harshaw Chemical Co.; two kinds of specimens used, lapped and polished lamellar specimens as thin as 100 μm for transmittance measurements and plate specimens of about 1 cm thick with one surface lapped and polished for refractivity measurements; measurements made using a Michelson interferometer operated in the asymmetric mode; absorption coefficients deduced from transmittance and reflectance measurements; data extracted from a figure.
2	137	Bauer, G.	1934	T	$4.41\times10^{4}-5.4\times10^{4}$	293	Crystal; thin film specimens of various thicknesses; absorption coefficients of bulk crystal deduced from transmittance and specimen thickness measurements; data extracted from a table.
3	123	Blechschmidt, D., Klucker, R., and Skibowski, M.	1969	R	$9.58\times10^{4}-2.22\times10^{5}$	293	Single crystal; provided by Karl Korth, Kiel, Germany; freshly cleaved specimen; absorption coefficients derived with the reflectivity versus angle of incidence method; data extracted from a figure.
4	145	Delbecq, C.J. and Yuster, P.H.	1954	R	$1.42\times10^{4}-4.51\times10^{4}$	293	Single crystal; obtained from the Harshaw Chemical Co. or grown by the Kyropoulos method; geometry not specified; absorption-coefficient data extracted from a figure.
5	142	Eldridge, J.E. and Kembry, K.A.	1973	T	$2.5\times10^{1}-3.0\times10^{2}$	300	Single crystal from Harshaw Chemical Co.; sample cleaned in toluene, rinsed in alcohol, then dried and polished; sample thickness 0.01-1.0 cm (wedge shape); absorption coefficients deduced from transmission measurements; data extracted from a figure.
6	142	Eldridge, J.E. and Kembry, K.A.	1973	T	$2.8\times10^{1}-2.52\times10^{2}$	77	Above specimen and conditions except measured at a lower temperature.
7	142	Eldridge, J.E. and Kembry, K.A.	1973	T	$6.9\times10^{1}-2.4\times10^{2}$	12	Above specimen and conditions except measured at a lower temperature.
8	77	Tomiki, T., Miyata, T., and Tsukamoto, H.	1974	R	$4.54\times10^{4}-4.65\times10^{4}$	65	Single crystal; obtained from the Harshaw Chemical Co.; absorption coefficients deduced from reflection spectrum; data extracted from a figure.
9	77	Tomiki, T., et al.	1974	R	$4.25\times10^{4}-4.5\times10^{4}$	165	Similar to above except at a higher temperature.
10	77	Tomiki, T., et al.	1974	R	$4.03\times10^{4}-4.32\times10^{4}$	295	Similar to above except at a higher temperature.
11	77	Tomiki, T., et al.	1974	R	$3.93\times10^{4}-4.22\times10^{4}$	367	Same as above except at a higher temperature.
12	77	Tomiki, T., et al.	1974	R	$3.8\times10^{4}-4.1\times10^{4}$	455	Same as above except at a higher temperature.
13	77	Tomiki, T., et al.	1974	R	$3.64\times10^{4}-3.95\times10^{4}$	595	Same as above except at a higher temperature.

TABLE 53. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF POTASSIUM IODIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
14	126	Philipp, H.R. and Ehrenreich, H.	1963	R	$4.35\times10^{4}-1.86\times10^{5}$	298	Single crystal; near normal reflection spectrum obtained; absorption coefficients deduced by the Kramers-Kronig relations; absorption-coefficient data extracted from a figure.
15	104	Harrington, J.A., Duthler, C.J., Patten, F.W., and Hass, M.	1976	C	244-495	300	Single crystal; obtained from the Harshaw Chemical Co.; experimental detail not given; data extracted from a figure.
16	104	Harrington, J.A. et al.	1976	C	242-427	80	Same as above.

TABLE 54. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM IODIDE (Wavenumber Dependence)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

ν	α
DATA SET 1	
T = 300.0	
2.276E+2	3.432E+1
2.165E+2	8.434E+0
2.035E+2	1.493E+1
1.960E+2	2.335E+1
1.845E+2	6.275E+1
1.727E+2	1.232E+2
1.667E+2	1.695E+2
1.626E+2	2.139E+2
1.603E+2	2.703E+2
1.580E+2	3.352E+2
1.574E+2	4.417E+2
1.537E+2	5.711E+2
1.498E+2	7.511E+2
1.463E+2	8.519E+2
1.449E+2	9.510E+2
1.416E+2	9.773E+2
1.357E+2	9.311E+2
1.330E+2	9.525E+2
1.294E+2	1.045E+3
1.258E+2	1.165E+3
1.209E+2	1.433E+3
1.160E+2	3.537E+3
1.156E+2	5.063E+3
1.124E+2	5.935E+3
1.002E+2	5.297E+3
9.864E+1	3.759E+3
9.704E+1	2.570E+3
9.480E+1	1.361E+3
9.400E+1	9.499E+2
9.230E+1	7.213E+2
9.030E+1	5.619E+2
8.714E+1	3.76 E+2
8.414E+1	2.335E+2
8.130E+1	2.393E+2
7.730E+1	1.374E+2
6.530E+1	1.667E+2
6.070E+1	1.439E+2
5.650E+1	1.210E+2
5.250E+1	1.031E+2

ν	α
DATA SET 1(CONT.)	
4.450E+1	8.258E+1
4.410E+1	6.155E+1
4.120E+1	4.675E+1
3.990E+1	3.613E+1
3.530E+1	2.362E+1
3.190E+1	1.475E+1
2.850E+1	8.560E+0
2.580E+1	5.252E+0
2.210E+1	2.472E+0
DATA SET 2	
T = 293.0	
5.382E+4	9.300E+5
5.336E+4	1.077E+6
5.202E+4	7.501E+5
5.165E+4	2.931E+5
5.024E+4	2.571E+5
4.930E+4	2.590E+5
4.847E+4	2.574E+5
4.702E+4	2.250E+5
4.654E+4	2.920E+5
4.556E+4	7.180E+5
4.415E+4	4.310E+4
DATA SET 3	
T = 293.0	
2.213E+5	6.896E+5
2.170E+5	6.720E+5
2.134E+5	6.596E+5
2.034E+5	6.547E+5
2.005E+5	6.070E+5
2.044E+5	6.731E+5
2.019E+5	6.531E+5
1.995E+5	6.200E+5
1.956E+5	6.070E+5
1.911E+5	5.932E+5
1.856E+5	5.853E+5
1.778E+5	5.698E+5

ν	α
DATA SET 3(CONT.)	
1.754E+5	5.731E+5
1.738E+5	5.659E+5
1.690E+5	5.939E+5
1.662E+5	6.579E+5
1.653E+5	5.672E+5
1.607E+5	8.604E+5
1.596E+5	8.022E+5
1.577E+5	6.085E+5
1.559E+5	5.485E+5
1.518E+5	4.940E+5
1.481E+5	4.689E+5
1.445E+5	4.576E+5
1.418E+5	4.543E+5
1.383E+5	4.598E+5
1.363E+5	4.847E+5
1.335E+5	5.035E+5
1.329E+5	5.745E+5
1.296E+5	5.700E+5
1.271E+5	5.734E+5
1.248E+5	5.836E+5
1.235E+5	6.070E+5
1.216E+5	6.106E+5
1.185E+5	5.140E+5
1.166E+5	4.462E+5
1.147E+5	4.309E+5
1.126E+5	4.188E+5
1.097E+5	4.090E+5
1.073E+5	4.030E+5
1.048E+5	4.084E+5
1.030E+5	4.271E+5
1.015E+5	4.364E+5
9.944E+4	4.423E+5
9.750E+4	4.961E+5
9.569E+4	5.422E+5
DATA SET 4	
T = 293.0	
4.505E+4	3.160E+1
4.464E+4	2.630E+1

ν	α
DATA SET 4(CONT.)	
4.428E+4	2.200E+1
4.386E+4	1.930E+1
4.345E+4	1.650E+1
4.310E+4	1.480E+1
4.274E+4	1.260E+1
4.237E+4	1.130E+1
4.202E+4	9.800E+0
4.167E+4	8.600E+0
4.132E+4	7.300E+0
4.115E+4	6.500E+0
4.105E+4	6.200E+0
4.000E+4	5.200E+0
3.846E+4	4.500E+0
2.000E+4	3.500E+0
1.815E+4	3.600E+0
1.657E+4	3.600E+0
1.538E+4	3.600E+0
1.427E+4	3.600E+0
DATA SET 5	
T = 300.0	
3.000E+2	6.607E-1
2.860E+2	6.316E-1
2.640E+2	1.349E+0
2.530E+2	2.395E+0
2.370E+2	3.981E+0
2.280E+2	6.607E+0
2.070E+2	2.042E+1
1.950E+2	4.169E+1
1.850E+2	6.457E+1
1.800E+2	7.762E+1
1.760E+2	8.710E+1
1.710E+2	1.122E+2
1.680E+2	1.413E+2
1.640E+2	1.778E+2
1.620E+2	2.239E+2
1.590E+2	2.884E+2
1.560E+2	4.677E+2
1.540E+2	3.981E+2

ν	α
DATA SET 5(CONT.)	
1.530E+2	4.266E+2
1.520E+2	5.248E+2
8.900E+1	3.631E+2
8.600E+1	2.754E+2
8.300E+1	2.188E+2
7.500E+1	1.738E+2
6.600E+1	1.738E+2
6.000E+1	1.479E+2
5.400E+1	1.072E+2
4.700E+1	7.244E+1
4.100E+1	4.074E+1
3.500E+1	2.089E+1
3.000E+1	9.120E+0
2.800E+1	5.012E+0
2.500E+1	1.000E-1
DATA SET 6	
T = 77.0	
2.520E+2	1.349E-1
2.460E+2	1.778E-1
2.420E+2	2.344E-1
2.390E+2	3.467E-1
2.320E+2	7.413E-1
2.270E+2	1.148E+0
2.190E+2	1.862E+0
2.120E+2	2.754E+0
2.050E+2	3.631E+0
2.000E+2	4.169E+0
1.970E+2	5.370E+0
1.950E+2	7.079E+0
1.930E+2	1.072E+1
1.890E+2	1.349E+1
1.870E+2	1.698E+1
1.830E+2	1.995E+1
1.740E+2	3.311E+1
1.720E+2	4.365E+1
1.680E+2	5.888E+1
1.660E+2	8.511E+1
1.640E+2	1.122E+2

ν	α
DATA SET 6(CONT.)	
1.630E+2	1.585E+2
1.620E+2	2.291E+2
1.620E+2	2.512E+2
1.600E+2	2.344E+2
1.600E+2	1.950E+2
1.590E+2	1.778E+2
1.570E+2	1.950E+2
1.590E+2	2.630E+2
1.520E+2	3.690E+2
1.500E+2	4.571E+2
1.490E+2	4.266E+2
1.460E+2	3.631E+2
1.110E+2	1.413E+2
9.400E+1	8.511E+1
8.300E+1	4.571E+1
8.200E+1	4.169E+1
7.000E+1	5.129E+1
7.000E+1	4.571E+1
6.300E+1	3.388E+1
5.000E+1	1.778E+1
4.000E+1	1.230E+1
4.200E+1	9.120E+0
3.500E+1	6.026E+0
3.400E+1	3.162E+0
3.300E+1	2.089E+0
2.500E+1	2.630E-1
2.000E+1	1.000E-1
DATA SET 7	
T = 12.0	
2.390E+2	1.000E-1
2.350E+2	1.413E-1
2.340E+2	2.754E-1
2.320E+2	3.981E-1
2.300E+2	4.786E-1
2.230E+2	7.244E-1
2.110E+2	1.148E+0
2.050E+2	1.349E+0
1.990E+2	1.585E+0

TABLE 54. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM IODIDE (Wavenumber Dependence) (continued)

DATA SET 7 (CONT.)

ν	α
1.960E+2	2.033E+0
1.920E+2	2.592E+1
9.300E+1	3.355E+0
8.700E+1	1.412E+0
8.100E+1	7.244E-1
7.700E+1	5.495E-1
7.400E+1	4.677E-1
6.900E+1	4.074E-1

DATA SET 8
T = 65.0

ν	α
4.642E+4	9.908E+0
4.636E+4	7.950E+0
4.635E+4	6.091E+0
4.630E+4	4.309E+0
4.627E+4	5.347E+0
4.623E+4	3.345E+0
4.620E+4	3.357E+0
4.620E+4	2.553E+0
4.617E+4	3.643E+0
4.616E+4	2.213E+0
4.614E+4	2.547E+0
4.603E+4	1.373E+0
4.596E+4	1.614E+0
4.598E+4	1.374E+0
4.598E+4	1.259E+0
4.594E+4	1.159E+0
4.587E+4	9.375E-1
4.563E+4	7.073E-1
4.545E+4	9.551E-1
4.545E+4	5.545E-1

DATA SET 9
T = 135.0

ν	α
4.484E+4	1.617E+1
4.481E+4	1.271E+1
4.477E+4	9.817E+0
4.473E+4	7.447E+0

DATA SET 9 (CONT.)

ν	α
4.463E+4	4.305E+0
4.453E+4	2.079E+0
4.444E+4	1.075E+0
4.432E+4	1.067E+0
4.432E+4	8.372E-1
4.422E+4	7.345E-1
4.422E+4	6.133E-1
4.415E+4	6.138E-1
4.412E+4	4.966E-1
4.402E+4	3.400E-1
4.390E+4	2.979E-1
4.383E+4	2.547E-1
4.376E+4	2.159E-1
4.366E+4	2.159E-1
4.354E+4	1.973E-1
4.346E+4	1.714E-1
4.335E+4	1.578E-1
4.327E+4	1.349E-1
4.313E+4	1.527E-1
4.287E+4	1.420E-1
4.273E+4	1.242E-1
4.252E+4	1.039E-1

DATA SET 10
T = 295.0

ν	α
4.316E+4	2.032E+1
4.322E+4	1.535E+1
4.303E+4	1.143E+1
4.304E+4	8.472E+0
4.295E+4	7.244E+0
4.290E+4	4.853E+0
4.282E+4	3.373E+0
4.273E+4	2.523E+0
4.260E+4	1.578E+0
4.256E+4	1.169E+0
4.245E+4	8.395E-1
4.243E+4	7.413E-1
4.237E+4	6.516E-1
4.237E+4	4.764E-1

DATA SET 10 (CONT.)

ν	α
4.227E+4	5.037E-1
4.225E+4	3.750E-1
4.216E+4	3.426E-1
4.202E+4	1.968E-1
4.192E+4	1.493E-1
4.165E+4	1.122E-1
4.149E+4	1.014E-1
4.129E+4	7.447E-2
4.109E+4	8.318E-2
4.094E+4	8.128E-2
4.070E+4	8.126E-2
4.060E+4	9.333E-2
4.047E+4	6.982E-2
4.030E+4	6.823E-2

DATA SET 11
T = 367.0

ν	α
4.219E+4	1.914E+1
4.213E+4	2.159E+1
4.210E+4	1.714E+1
4.208E+4	1.556E+1
4.205E+4	1.219E+1
4.196E+4	1.175E+1
4.197E+4	1.057E+1
4.192E+4	8.710E+0
4.182E+4	6.223E+0
4.173E+4	5.012E+0
4.162E+4	4.018E+0
4.158E+4	2.793E+0
4.149E+4	2.023E+0
4.140E+4	1.706E+0
4.132E+4	1.459E+0
4.129E+4	1.549E+0
4.123E+4	1.136E+0
4.115E+4	9.638E-1
4.115E+4	8.710E-1
4.106E+4	7.345E-1
4.100E+4	6.792E-1
4.090E+4	5.888E-1

DATA SET 11 (CONT.)

ν	α
4.096E+4	5.420E-1
4.090E+4	4.111E-1
4.037E+4	5.105E-1
4.079E+4	3.319E-1
4.063E+4	2.606E-1
4.048E+4	1.965E-1
4.032E+4	1.294E-1
4.015E+4	1.047E-1
3.999E+4	1.096E-1
3.931E+4	8.106E-2
3.905E+4	8.166E-2
3.944E+4	6.067E-2
3.933E+4	7.762E-2

DATA SET 12
T = 455.0

ν	α
4.077E+4	1.862E+1
4.074E+4	1.778E+1
4.072E+4	1.346E+1
4.066E+4	1.318E+1
4.061E+4	1.191E+1
4.057E+4	9.290E+0
4.051E+4	8.356E+0
4.048E+4	7.211E+0
4.038E+4	5.908E+0
4.029E+4	4.786E+0
4.023E+4	4.385E+0
4.015E+4	3.631E+0
4.006E+4	2.858E+0
3.998E+4	2.377E+0
3.990E+4	1.863E+0
3.985E+4	1.563E+0
3.970E+4	1.343E+0
3.969E+4	1.143E+0
3.960E+4	1.005E+0
3.952E+4	7.047E-1
3.944E+4	6.109E-1
3.939E+4	5.370E-1
3.930E+4	4.406E-1

DATA SET 12 (CONT.)

ν	α
3.919E+4	3.388E-1
3.913E+4	[illegible].119E-1
3.904E+4	2.918E-1
3.898E+4	2.692E-1
3.893E+4	2.249E-1
3.883E+4	2.061E-1
3.877E+4	1.480E-1
3.870E+4	1.486E-1
3.860E+4	1.542E-1
3.845E+4	1.614E-1
3.831E+4	1.180E-1
3.815E+4	8.954E-2
3.801E+4	9.247E-2

DATA SET 13
T = 595.0

ν	α
3.944E+4	1.905E+1
3.940E+4	1.501E+1
3.927E+4	1.247E+1
3.922E+4	9.516E+0
3.910E+4	7.980E+0
3.905E+4	6.516E+0
3.900E+4	5.200E+0
3.893E+4	4.920E+0
3.885E+4	4.240E+0
3.877E+4	3.631E+0
3.867E+4	3.192E+0
3.860E+4	2.716E+0
3.855E+4	2.410E+0
3.843E+4	1.883E+0
3.839E+4	1.622E+0
3.833E+4	1.400E+0
3.824E+4	1.095E+0
3.817E+4	9.772E-1
3.810E+4	8.204E-1
3.798E+4	6.081E-1
3.782E+4	4.831E-1
3.769E+4	3.784E-1
3.756E+4	3.483E-1

DATA SET 13 (CONT.)

ν	α
3.747E+4	2.724E-1
3.730E+4	2.249E-1
3.716E+4	1.837E-1
3.644E+4	1.380E-1

DATA SET 14
T = 299.0

ν	α
1.855E+5	9.100E+5
1.805E+5	7.900E+5
1.774E+5	7.400E+5
1.734E+5	8.200E+5
1.710E+5	6.900E+5
1.669E+5	8.900E+5
1.645E+5	8.400E+5
1.621E+5	7.400E+5
1.597E+5	8.000E+5
1.581E+5	1.090E+6
1.543E+5	8.400E+5
1.532E+5	7.600E+5
1.500E+5	6.800E+5
1.427E+5	6.000E+5
1.379E+5	6.100E+5
1.347E+5	6.700E+5
1.315E+5	7.400E+5
1.274E+5	7.420E+5
1.234E+5	6.500E+5
1.210E+5	6.700E+5
1.194E+5	6.300E+5
1.153E+5	4.600E+5
1.113E+5	5.100E+5
1.073E+5	5.100E+5
1.032E+5	4.500E+5
9.758E+4	5.000E+5
9.113E+4	5.300E+5
8.316E+4	7.300E+5
7.823E+4	9.400E+5
7.581E+4	8.300E+5
7.016E+4	5.000E+5
6.094E+4	5.500E+5

TABLE 54. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM IODIDE (Wavenumber Dependence) (continued)

DATA SET 14 (CONT.)

ν	α
6.290E+4	5.600E+5
6.129E+4	3.800E+5
5.337E+4	6.300E+5
5.726E+4	6.900E+5
5.559E+4	6.600E+5
5.323E+4	4.300E+5
5.0[illegible]E+4	2.900E+5
5.0[illegible]E+4	2.710E+5
4.919E+4	2.700E+5
4.758E+4	2.300E+5
4.597E+4	8.400E+5
4.526E+4	3.600E+5
4.435E+4	1.900E+5
4.355E+4	5.000E+4

DATA SET 15
T = 3[illegible]

ν	α
2.440E+2	3.610E+0
2.490E+2	2.710E+0
2.640E+2	2.450E+0
2.690E+2	1.830E+0
2.830E+2	1.230E+0
2.900E+2	9.530E-1
3.130E+2	7.840E-1
3.[illegible]70E+2	6.250E-1
3.240E+2	4.990E-1
3.320E+2	3.550E-1
3.420E+2	2.670E-1
3.540E+2	2.250E-1
3.630E+2	1.610E-1
3.730E+2	1.210E-1
3.830E+2	7.690E-2
3.[illegible]30E+2	5.790E-2
3.900E+2	5.470E-2
4.020E+2	4.370E-2
4.120E+2	2.940E-2
4.220E+2	2.210E-2
4.320E+2	1.570E-2
4.410E+2	1.330E-2

DATA SET 15 (CONT.)

ν	α
4.510E+2	1.000E-2
4.580E+2	7.540E-3
4.680E+2	6.740E-3
4.830E+2	6.030E-3
4.950E+2	4.540E-3

DATA SET 16
T = 80.0

ν	α
2.420E+2	9.230E-1
2.540E+2	6.210E-1
2.590E+2	3.940E-1
2.670E+2	2.970E-1
2.710E+2	2.110E-1
2.740E+2	2.110E-1
2.840E+2	1.340E-1
2.840E+2	1.420E-1
2.910E+2	1.070E-1
2.890E+2	6.050E-2
2.930E+2	8.530E-2
3.010E+2	1.130E-1
3.010E+2	4.570E-2
3.050E+2	1.270E-1
3.100E+2	7.210E-2
3.150E+2	1.270E-1
3.130E+2	1.010E-1
3.230E+2	1.270E-1
3.250E+2	9.590E-2
3.300E+2	1.510E-1
3.350E+2	7.220E-2
3.420E+2	1.280E-1
3.440E+2	4.360E-2
3.510E+2	1.020E-1
3.540E+2	3.460E-2
3.590E+2	5.450E-2
3.660E+2	1.960E-2
3.710E+2	3.880E-2
3.760E+2	1.180E-2
3.810E+2	2.470E-2
3.860E+2	7.920E-2

DATA SET 16 (CONT.)

ν	α
3.910E+2	9.390E-2
3.960E+2	5.960E-3
4.050E+2	4.240E-3
4.200E+2	3.020E-3
4.270E+2	2.280E-3

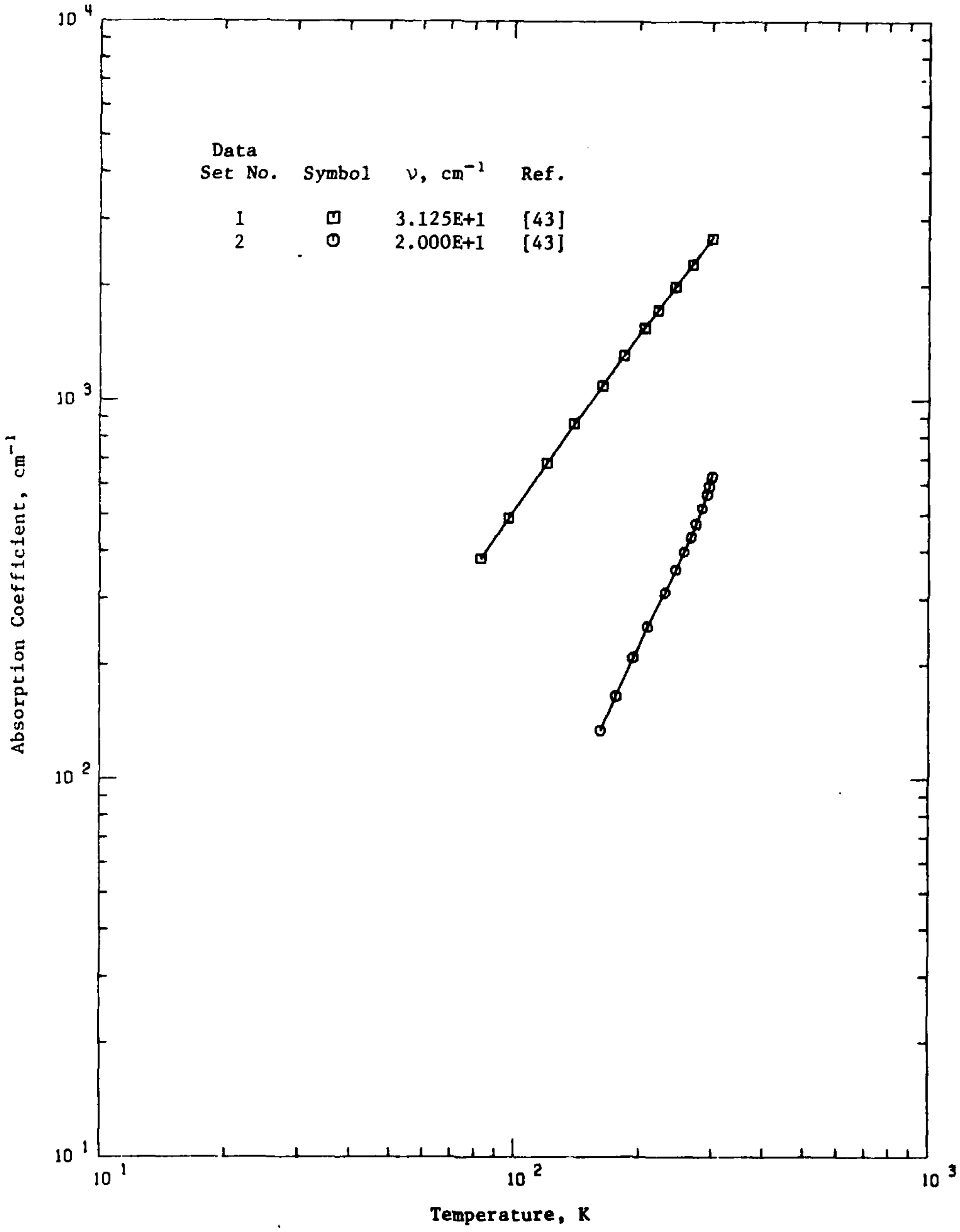

Figure 36. Absorption Coefficient of Potassium Iodide (Temperature Dependence)

TABLE 55. SUMMARY OF MEASUREMENT ON THE ABSORPTION COEFFICIENT OF POTASSIUM IODIDE (Temperature Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	43	Stolen, R. and Dransfeld, K.	1965	T	31.25	83-300	High purity; single crystal; grown by the Bridgman method; plate specimens of thickness from 0.5 to 25.0 mm; absorption coefficients directly determined; data extracted from a figure.
2	43	Stolen, R. and Dransfeld, K.	1965	T	20	162-300	Same as above except for a longer wavelength.

TABLE 56. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF POTASSIUM IODIDE (Temperature Dependence)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

T	α
DATA SET 1	
ν = 3.125E+1	
82.0	3.319E+2
97.0	4.879E+2
120.0	6.824E+2
143.0	3.047E+2
163.0	1.039E+3
184.0	1.312E+3
206.0	1.551E+3
222.0	1.727E+3
244.0	1.939E+3
269.0	2.279E+3
300.0	2.671E+3
DATA SET 2	
ν = 2.000E+1	
152.0	1.344E+2
170.0	1.655E+2
194.0	2.034E+2
210.0	2.523E+2
231.0	3.105E+2
245.0	3.571E+2
257.0	3.973E+2
267.0	4.357E+2
274.0	4.724E+2
284.0	5.201E+2
292.0	5.643E+2
296.0	5.942E+2
300.0	6.303E+2

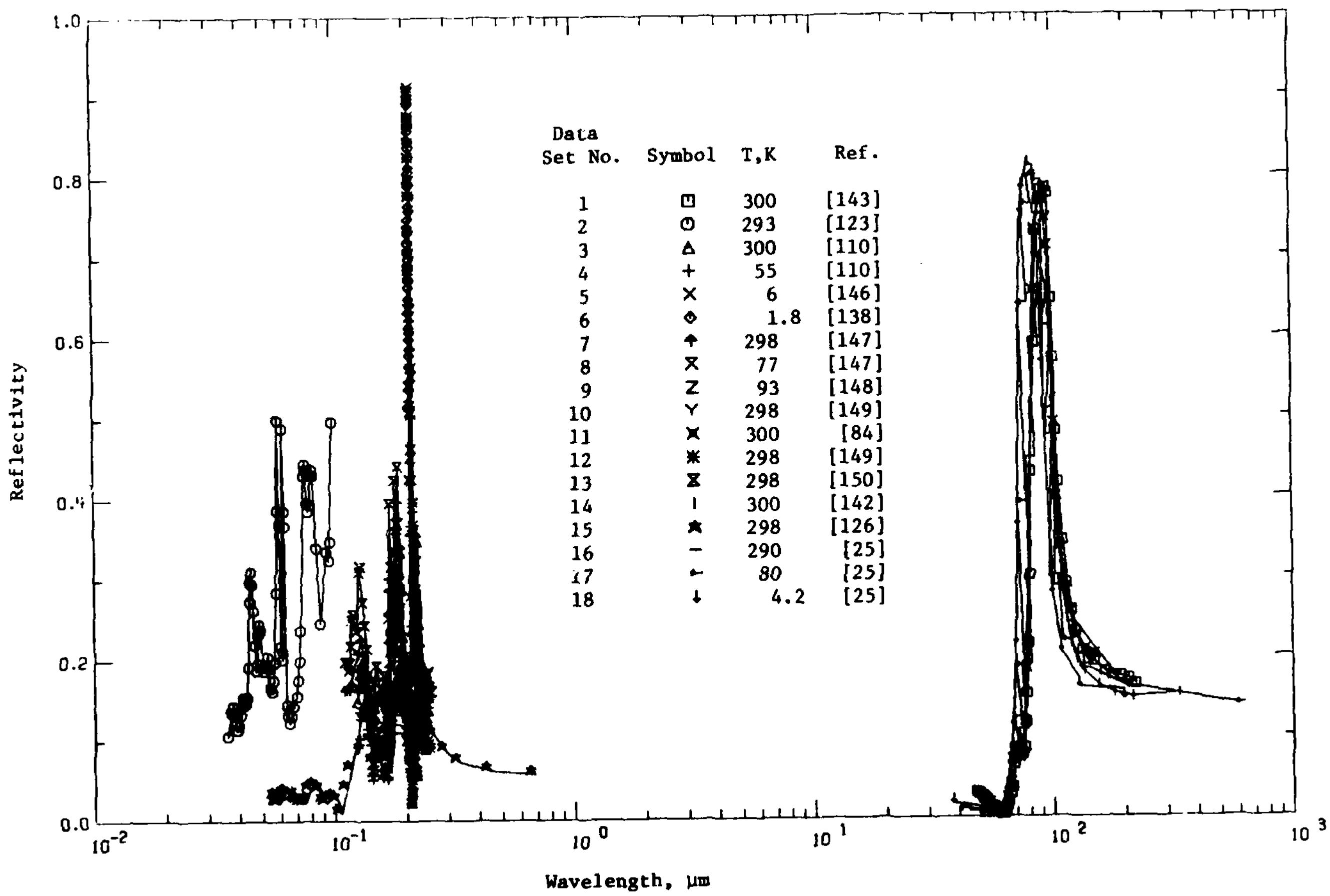

Figure 37. Reflectivity of Potassium Iodide

TABLE 57. SUMMARY OF MEASUREMENTS ON THE REFLECTIVITY OF POTASSIUM IODIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	143	Berg, J.I. and Bell, E.E.	1971	R	47.34-218.8	300	Crystal; obtained from the Harshaw Chemical Co.; lapped and polished plate specimens of about 1 cm thick; reflection spectrum obtained; data extracted from a figure.
2	123	Blechschmidt, D., Klucker, R., and Skibowski, M.	1969	R	0.035-0.099	293	Single crystal; provided by Karl Korth, Kiel, Germany; freshly cleaved specimen; near normal reflectivity measured in vacuum for polarized light with normal of the specimen lying on both sides of the incident beam for increased accuracy; data extracted from a figure.
3	110	Baldini, G. and Bosacchi, B.	1968	R	0.124-0.243	300	Single crystal; specimen with cleaved surface; back surface of the specimen treated with an emery cloth to reduce the reflection from the back; near normal reflectivity obtained with specimen in vacuum; data extracted from a figure.
4	110	Baldini, G. and Bosacchi, B.	1968	R	0.124-0.243	55	Same as above except at low temperature.
5	146	Baldini, G., Bosacchi, A., and Bosacchi, B.	1969	R	0.198-0.216	6	Cleaved crystal; sample geometry and origin not specified; near normal incidence; data extracted from a curve.
6	138	Petroff, Y., Pinchaux, R., Chekroun, C., Balkanski, M., and Kamimura, H.	1971	R	0.209-0.213	1.8	Single crystal; specimen cleaved in liquid helium to avoid surface contamination; near normal reflection spectrum obtained; data extracted from a curve.
7	147	Roessler, D.M.	1967	R	0.110-0.248	298	Crystal specimen cleaved in air; exposed to atmosphere for 2 minutes; near normal reflectivity measured in vacuum; data extracted from a curve.
8	147	Roessler, D.M.	1967	R	0.110-0.248	77	Same as above except at a low temperature.
9	148	Weeks, R.F.	1958	R	0.201-0.253	93	Single crystal; cleaved; near normal reflectivity measured in vacuum; data extracted from a curve.
10	149	Kato, R. and Watanabe, M.	1968	R	0.165-0.248	298	Single crystal; grown from the melt; 2 mm thick; freshly cleaved in air; near normal reflectivity measured in vacuum; data extracted from a curve.
11	84	Mitsuishi, A. and Yamada, Y.	1962	R	59.9-149	300	Single crystal; near normal reflectivity measured in vacuum with aluminum mirror reference standard; data extracted from a curve.
12	149	Kato, R. and Watanabe, M.	1968	R	0.165-0.248	298	Film specimen deposited on LiF substitute; near normal reflectivity measured in vacuum; data extracted from a curve.
13	150	Vishnevski, V.N., Stefanski, I.V., Kuzyk, M.P., Kulik, Z.S., and Kulik, L.N.	1973	R	0.154-0.239	298	Single crystal; grown by Kyropoulos method; near normal reflection spectrum obtained; data extracted from a figure.

TABLE 57. SUMMARY OF MEASUREMENTS ON THE REFLECTIVITY OF POTASSIUM IODIDE (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, µm	Temperature, K	Specifications and Remarks
14	142	Eldrige, J.E. and Kembry, K.A.	1973	R	62.5-333.4	300	Crystal specimen cleaved in air; exposed to atmosphere for 2 minutes; near normal reflectivity measured in vacuum; data extracted from a curve.
15	126	Philipp, H.R. and Ehrenreich, H.	1963	R	0.053-0.653	298	Single crystal; near normal reflection spectrum obtained; data extracted from a curve.
16	25	Hadni, A., Claudel, J., Morlot, G., and Strimer, P.	1968	R	42-196	290	Single crystal; high purity; reflectivity spectrum of 15° incident angle obtained; data extracted from a figure.
17	25	Hadni, A. et al.	1968	R	42-600	80	Same as above.
18	25	Hadni, A. et al.	1968	R	38-195	4.2	Same as above.

TABLE 58. EXPERIMENTAL DATA ON THE REFLECTIVITY OF POTASSIUM IODIDE

[Wavelength, λ, μm; Temperature, T, K; Reflectivity, ρ]

DATA SET 1
T = 300.0

λ	ρ
47.3	0.0311
48.4	0.0293
49.8	[illegible]
50.7	0.0235
51.4	0.0112
53.2	0.0130
55.6	0.0123
57.2	0.0134
58.5	0.0057
59.8	0.0136
60.5	0.0143
[illegible]	0.0123
[illegible]	0.0132
61.6	0.0230
61.8	0.0344
62.1	0.0059
[illegible]	0.0074
63.3	[illegible]
64.1	[illegible]
65.4	0.0296
65.6	0.0350
68.3	0.095
70.1	0.074
72.2	0.074
73.3	0.079
74.9	0.090
75.6	0.113
77.1	0.153
78.6	0.216
80.1	0.301
81.0	0.430
84.1	0.591
87.1	0.733
89.0	0.757
89.2	0.769
91.7	0.781
94.9	0.793
95.7	0.776
99.6	0.645

DATA SET 1 (CONT.)

λ	ρ
101.0	0.571
103.4	0.486
105.7	0.416
109.3	0.344
114.5	0.291
118.3	0.258
124.2	0.231
132.2	0.207
138.5	0.195
147.0	0.193
153.0	0.181
176.0	0.175
193.7	0.175
204.3	0.172
218.8	0.165

DATA SET 2
T = 233.0

λ	ρ
0.0356	0.130
0.0371	0.136
0.0376	0.143
0.0383	0.136
0.0385	0.124
0.0389	0.114
0.0392	0.114
0.0398	0.120
0.0406	0.133
0.0412	0.144
0.0416	0.154
0.0421	0.149
0.0424	0.145
0.0430	0.154
0.0438	0.192
0.0445	0.273
0.0447	0.297
0.0450	0.326
0.0455	0.295
0.0460	0.262
0.0467	0.219

DATA SET 2 (CONT.)

λ	ρ
0.0472	0.187
0.0475	0.196
0.0483	0.233
0.0488	0.245
0.0492	0.237
0.0505	0.194
0.0511	0.136
0.0517	0.192
0.0525	0.205
0.0531	0.191
0.0541	0.166
0.0543	0.161
0.0557	0.175
0.0563	0.198
0.0575	0.285
0.0583	0.367
0.0586	0.500
0.0595	0.370
0.0601	0.218
0.0605	0.201
0.0609	0.211
0.0612	0.489
0.0620	0.396
0.0625	0.367
0.0633	0.145
0.0638	0.131
0.0647	0.122
0.0663	0.131
0.0672	0.142
0.0695	0.155
0.0706	0.175
0.0715	0.199
0.0726	0.237
0.0753	0.434
0.0763	0.444
0.0767	0.437
0.0775	0.396
0.0782	0.385
0.0793	0.393
0.0806	0.430

DATA SET 2 (CONT.)

λ	ρ
0.0813	0.438
0.0820	0.431
0.0844	0.340
0.0877	0.246
0.0928	0.335
0.0949	0.324
0.0962	0.347
0.0993	0.497

DATA SET 3
T = 300.0

λ	ρ
0.124	0.1492
0.126	0.1607
0.128	0.1824
0.129	0.1919
0.130	0.1977
0.132	0.1977
0.135	0.1799
0.138	0.1542
0.142	0.1327
0.143	0.1276
0.146	0.1410
0.150	0.1522
0.151	0.1559
0.154	0.1559
0.156	0.1545
0.161	0.1545
0.163	0.1439
0.166	0.1324
0.168	0.1469
0.169	0.1762
0.170	0.2104
0.171	0.2275
0.172	0.2410
0.175	0.2466
0.177	0.2461
0.180	0.2393
0.186	0.3698
0.188	0.3342

DATA SET 3 (CONT.)

λ	ρ
0.190	0.2354
0.192	0.2290
0.195	0.1945
0.196	0.1595
0.202	0.1545
0.207	0.1443
0.209	0.1303
0.212	0.1639
0.213	0.1936
0.214	0.2045
0.217	0.2229
0.219	0.2334
0.221	0.3470
0.225	0.2449
0.227	0.1977
0.231	0.1698
0.234	0.1550
0.239	0.1459
0.243	0.1357

DATA SET 4
T = 55.0

λ	ρ
0.124	0.0914
0.125	0.0957
0.126	0.1130
0.126	0.1424
0.127	0.1208
0.128	0.1349
0.129	0.1352
0.130	0.1324
0.132	0.1324
0.133	0.1349
0.133	0.1353
0.134	0.1343
0.135	0.1300
0.136	0.1143
0.136	0.1009
0.137	0.1080
0.140	0.0953

DATA SET 4 (CONT.)

λ	ρ
0.141	0.0920
0.142	0.0465
0.142	0.0570
0.143	0.0510
0.144	0.0599
0.145	0.0657
0.146	0.0744
0.147	0.0790
0.148	0.0635
0.149	0.0933
0.150	0.1012
0.151	0.0995
0.153	0.1012
0.154	0.0910
0.155	0.0750
0.156	0.0836
0.157	0.0573
0.157	0.0543
0.158	0.0583
0.160	0.0645
0.162	0.0679
0.165	0.0520
0.166	0.0549
0.167	0.1033
0.168	0.2279
0.169	0.2534
0.169	0.2558
0.170	0.3024
0.172	0.2694
0.174	0.2344
0.177	0.1934
0.177	0.1992
0.180	0.3043
0.181	0.3342
0.182	0.3177
0.184	0.3591
0.185	0.3973
0.186	0.3775
0.188	0.2717
0.190	0.2244

TABLE 58. EXPERIMENTAL DATA ON THE REFLECTIVITY OF POTASSIUM IODIDE (continued)

DATA SET 4 (CONT.)

λ	ρ
0.192	0.1345
0.194	0.1754
0.196	0.1060
0.199	0.1511
0.200	0.1043
0.201	0.1349
0.204	0.1291
0.205	0.1776
0.208	0.2372
0.210	0.3557
0.211	0.5141
0.212	0.7764
0.215	0.4449
0.217	0.2799
0.219	0.2249
0.223	0.1932
0.228	0.1671
0.235	0.1459
0.243	0.1315

DATA SET 5
T = 5.0

λ	ρ
0.199	0.134
0.199	0.129
0.199	0.132
0.199	0.130
0.199	0.132
0.199	0.132
0.199	0.136
0.199	0.145
0.200	0.139
0.200	0.149
0.201	0.157
0.201	0.157
0.203	0.156
0.203	0.147
0.204	0.174
0.204	0.179
0.204	0.170

DATA SET 5 (CONT.)

λ	ρ
0.201	0.154
0.202	0.142
0.202	0.122
0.203	0.114
0.204	0.079
0.205	0.051
0.207	0.028
0.207	0.023
0.208	0.023
0.208	0.029
0.208	0.046
0.208	0.061
0.208	0.231
0.209	0.426
0.209	0.542
0.209	0.639
0.210	0.687
0.210	0.727
0.210	0.779
0.210	0.861
0.210	0.827
0.211	0.846
0.211	0.878
0.211	0.907
0.211	0.914
0.211	0.911
0.211	0.873
0.212	0.833
0.212	0.718
0.212	0.629
0.213	0.565
0.213	0.547
0.213	0.404
0.213	0.425
0.214	0.397
0.214	0.366
0.214	0.339
0.215	0.313
0.215	0.292

DATA SET 6
T = 1.8

λ	ρ
0.209	0.516
0.209	0.538
0.210	0.566
0.210	0.580
0.210	0.600
0.210	0.615
0.210	0.633
0.210	0.650
0.210	0.665
0.210	0.677
0.210	0.687
0.210	0.693
0.210	0.703
0.210	0.708
0.210	0.719
0.210	0.740
0.210	0.750
0.210	0.766
0.210	0.780
0.211	0.791
0.211	0.802
0.211	0.814
0.211	0.826
0.211	0.843
0.211	0.856
0.211	0.879
0.211	0.893
0.211	0.899
0.211	0.899
0.211	0.895
0.211	0.887
0.211	0.876
0.211	0.872
0.211	0.869
0.211	0.869
0.211	0.864
0.211	0.859
0.211	0.845
0.211	0.826

DATA SET 6 (CONT.)

λ	ρ
0.211	0.808
0.211	0.794
0.211	0.754
0.211	0.760
0.211	0.735
0.212	0.711
0.212	0.689
0.212	0.673
0.212	0.643
0.212	0.619
0.212	0.588
0.212	0.549
0.212	0.516

DATA SET 7
T = 300.0

λ	ρ
0.110	0.162
0.112	0.162
0.115	0.162
0.117	0.168
0.119	0.180
0.125	0.208
0.129	0.224
0.132	0.206
0.136	0.151
0.139	0.136
0.141	0.126
0.145	0.127
0.150	0.150
0.155	0.147
0.161	0.153
0.164	0.142
0.167	0.142
0.168	0.158
0.169	0.192
0.173	0.261
0.176	0.262
0.178	0.263
0.180	0.253

DATA SET 7 (CONT.)

λ	ρ
0.189	0.340
0.195	0.201
0.197	0.174
0.202	0.151
0.211	0.133
0.213	0.091
0.216	0.112
0.222	0.254
0.227	0.217
0.230	0.182
0.234	0.170
0.242	0.173
0.248	0.167

DATA SET 8
T = 77.0

λ	ρ
0.110	0.197
0.114	0.186
0.115	0.196
0.117	0.227
0.118	0.250
0.120	0.256
0.122	0.240
0.124	0.236
0.127	0.319
0.128	0.316
0.131	0.272
0.134	0.243
0.136	0.214
0.136	0.191
0.139	0.163
0.142	0.111
0.144	0.118
0.146	0.173
0.149	0.193
0.155	0.151
0.160	0.191
0.161	0.173
0.164	0.125

DATA SET 8 (CONT.)

λ	ρ
0.166	0.120
0.168	0.252
0.171	0.395
0.173	0.316
0.177	0.254
0.179	0.334
0.180	0.424
0.185	0.370
0.190	0.442
0.193	0.299
0.194	0.249
0.195	0.200
0.200	0.195
0.203	0.205
0.209	0.152
0.210	0.158
0.213	0.198
0.216	0.162
0.219	0.232
[illegible]	[illegible]
0.227	0.176
0.232	0.103
0.242	0.174
0.245	0.167

DATA SET 9
T = 93.0

λ	ρ
0.201	0.144
0.202	0.133
0.202	0.133
0.203	0.110
0.204	0.103
0.205	0.0942
0.205	0.0517
0.206	0.0675
0.207	0.0571
0.207	0.0466
0.208	0.0366
0.208	0.0264

TABLE 58. EXPERIMENTAL DATA ON THE REFLECTIVITY OF POTASSIUM IODIDE (continued)

λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ	λ	ρ
DATA SET 9(CONT.)		DATA SET 10		DATA SET 11(CONT.)		DATA SET 12(CONT.)		DATA SET 13(CONT.)		DATA SET 14(CONT.)	
		T = 298.0									
0.209	0.0232			102.	0.491	0.244	0.095	0.219	0.162	139.1	0.181
0.209	0.0465	0.169	0.116	104.	0.399	0.248	0.091	0.220	0.093	153.0	0.164
0.210	0.130	0.171	0.216	107.	0.337			0.224	0.153	178.5	0.154
0.210	0.232	0.172	0.227	112.	0.285	DATA SET 13		0.225	0.161	212.7	0.149
0.211	0.302	0.173	0.227	117.	0.256	T = 298.0		0.226	0.156	333.3	0.153
0.211	0.457	0.179	0.212	125.	0.225			0.230	0.113		
0.212	0.518	0.181	0.221	136.	0.209	0.154	0.099	0.231	[illegible]	DATA SET 15	
0.213	0.554	0.183	0.286	149.	0.203	0.156	0.095	0.233	0.095	T = 298.0	
0.213	0.511	0.183	0.279			0.160	0.089	0.235	0.091		
0.214	0.391	0.193	0.196	DATA SET 12		0.164	0.094	0.238	0.089	0.054	0.037
0.215	0.306	0.197	0.164	T = 298.0		0.166	0.083			0.055	0.029
0.215	0.200	0.203	0.131			0.167	0.087	DATA SET 14		0.056	0.026
0.216	0.244	0.208	0.114	0.165	0.129	0.169	0.105	T = 300.0		0.058	0.037
0.217	0.229	0.212	0.092	0.167	0.133	0.171	0.131			0.059	0.041
0.217	0.213	0.213	0.088	0.168	0.143	0.173	0.139	62.5	0.027	0.060	0.041
0.218	0.192	0.215	0.196	0.171	0.159	0.175	0.150	63.2	0.034	0.061	0.034
0.219	0.183	0.219	0.232	0.172	0.166	0.177	0.146	64.9	0.034	0.062	0.032
0.220	0.165	0.220	0.324	0.174	0.166	0.180	0.148	65.7	0.039	0.065	0.039
0.221	0.159	0.225	0.135	0.176	0.161	0.183	0.138	67.1	0.053	0.067	0.032
0.221	0.154	0.230	0.135	0.178	0.161	0.184	0.144	68.0	0.075	0.069	0.026
0.223	0.151	0.233	0.131	0.180	0.166	0.186	0.169	72.9	0.081	0.072	0.023
0.223	0.146	0.239	0.157	0.182	0.174	0.187	0.174	74.6	0.095	0.073	0.032
0.225	0.142	0.243	0.132	0.184	0.185	0.188	0.184	75.7	0.130	0.075	0.045
0.225	0.138	0.245	0.186	0.186	0.210	0.189	0.187	76.9	0.176	0.079	0.049
0.227	0.136	0.248	0.186	0.188	0.214	0.190	0.183	80.6	0.413	0.082	0.044
0.228	0.134			0.190	0.209	0.191	0.169	83.3	0.550	0.083	0.045
0.229	0.132	DATA SET 11		0.191	0.188	0.193	0.162	84.0	0.585	0.086	0.031
0.230	0.131	T = 300.0		0.194	0.169	0.196	0.113	85.4	0.613	0.088	0.023
0.231	0.129			0.195	0.150	0.198	0.101	88.4	0.650	0.091	0.033
0.232	0.127	63.3	0.024	0.197	0.141	0.201	0.095	90.0	0.689	0.094	0.035
0.233	0.125	67.4	0.072	0.201	0.125	0.202	0.086	90.9	0.698	0.098	0.031
0.234	0.123	72.0	0.091	0.209	0.104	0.204	0.081	93.4	0.673	0.102	0.015
0.238	0.119	75.3	0.119	0.211	0.101	0.207	0.064	96.1	0.661	0.107	0.046
0.240	0.129	77.2	0.185	0.214	0.110	0.209	0.084	99.0	0.600	0.113	0.073
0.245	0.140	84.1	0.656	0.216	0.121	0.210	0.080	102.0	0.432	0.128	0.167
0.246	0.153	86.2	0.732	0.219	0.154	0.211	0.074	104.1	0.366	0.133	0.133
0.250	0.160	89.7	0.768	0.221	0.157	0.212	0.070	108.6	0.295	0.141	0.081
0.253	0.151	92.2	0.768	0.230	0.127	0.215	0.073	113.6	0.250	0.155	0.114
		95.0	0.746	0.233	0.112	0.216	0.060	119.0	0.217	0.165	0.066
		96.8	0.711	0.240	0.100	0.218	0.057	125.0	0.196	0.169	0.058

TABLE 58. EXPERIMENTAL DATA ON THE REFLECTIVITY OF POTASSIUM IODIDE (continued)

λ	ρ
DATA SET 15(CONT.)	
0.173	0.167
0.185	0.257
0.197	0.137
0.207	0.113
0.213	0.077
0.219	0.291
0.225	0.149
0.245	0.112
0.275	0.093
0.319	0.079
0.429	0.067
0.653	0.062
DATA SET 16	
T = 296.0	
42.1	0.012
46.1	0.017
51.5	0.028
55.3	0.047
58.9	0.071
69.3	0.09[illegible]
73.8	0.109
77.2	0.131
81.2	0.448
84.8	0.534
88.5	0.642
9[illegible]	0.642
95.0	0.512
98.3	0.476
106.[illegible]	0.287
119.3	0.242
196.0	0.168
DATA SET 17	
T = [illegible]	
41.8	0.010
50.3	0.008
54.3	0.032
DATA SET 17(CONT.)	
58.5	0.021
62.5	0.005
64.5	0.035
68.1	0.085
70.1	0.123
72.2	0.188
74.6	0.392
76.1	0.64[illegible]
79.3	0.764
84.1	0.799
88.5	0.793
95.4	0.529
[illegible]	0.3[illegible]
114.4	0.219
130.0	0.184
213.1	0.162
6[illegible].9	0.146
DATA SET 18	
T = 4.2	
37.5	0.023
49.6	0.007
54.0	0.007
57.7	0.013
61.4	0.017
63.7	0.031
65.7	0.076
67.5	0.119
69.8	0.221
71.3	0.368
73.4	0.641
75.0	0.758
76.7	0.787
80.9	0.816
84.3	0.8[illegible]
87.7	0.753
90.7	0.572
99.4	0.284
107.6	0.211
DATA SET 18(CONT.)	
127.5	0.167
195.0	0.152

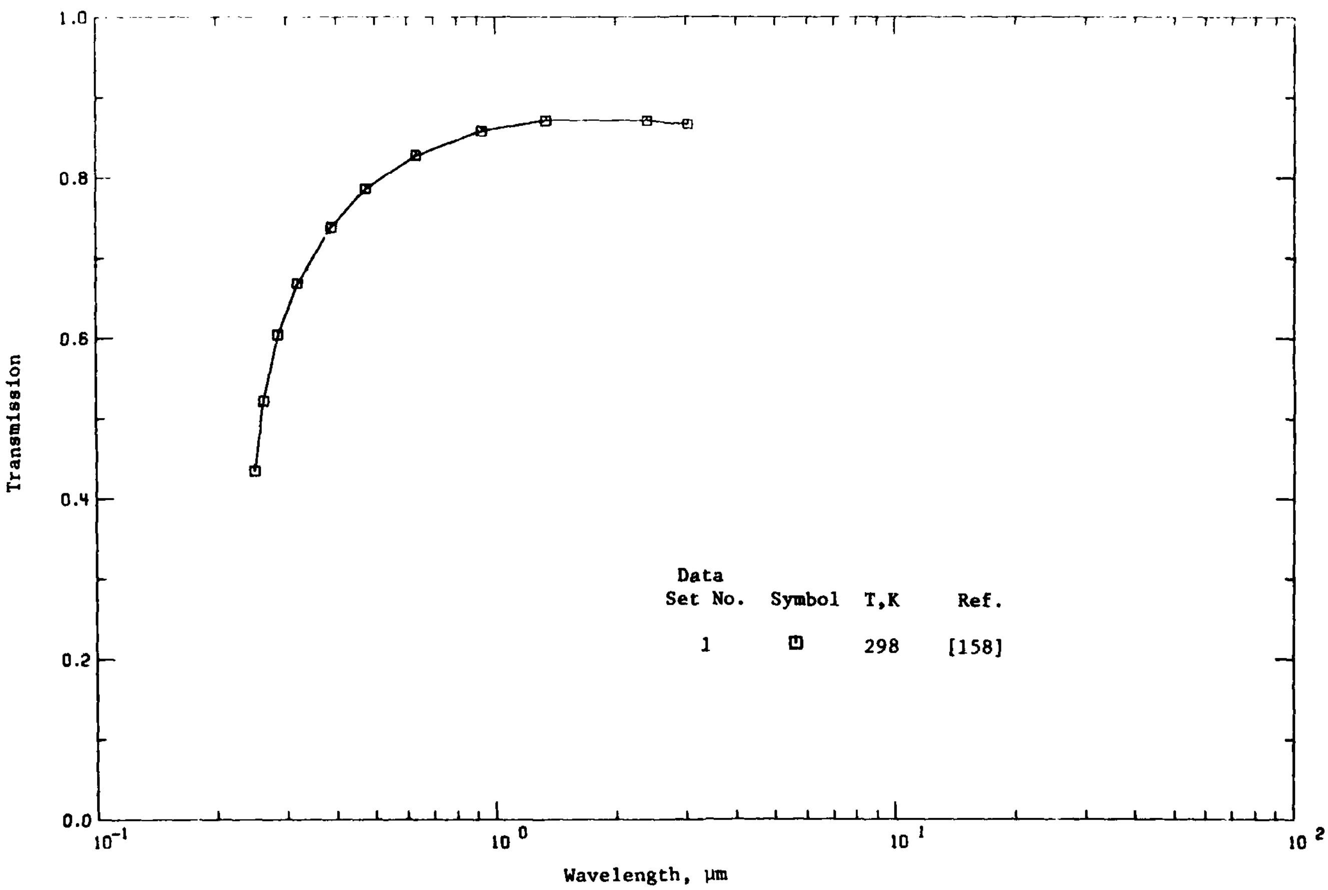

Figure 38. Transmission of Potassium Iodide

TABLE 59. SUMMARY OF MEASUREMENTS ON THE TRANSMISSION OF POTASSIUM IODIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	158	McCarthy, D.E.	1968	T	0.233-3.03	298	Single crystal; obtained from Harshaw Chemical Co.; 4.3 mm thick; transmission measured; data extracted from a figure.

TABLE 69. EXPERIMENTAL DATA ON THE TRANSMISSION OF POTASSIUM IODIDE

[Wavelength, λ, μm; Temperature, T, K; Transmission, τ]

DATA SET 1
T = 298.0

λ	τ
0.249	0.434
0.262	0.521
0.285	0.564
0.319	0.655
0.369	0.738
0.474	0.735
0.633	0.827
0.925	0.858
1.54	0.871
2.40	0.871
3.63	0.806

TABLE 61. PEAK POSITIONS (λ_{max}) IN µm AND HALF-WIDTHS (W) IN eV FOR THE F, R, M, AND N ABSORPTION BANDS IN POTASSIUM IODIDE*

Interionic dist., d (Å)	Temp.	F band		R_1 band	R_2 band	M band		N bands
		λ_{max}	W	λ_{max}	λ_{max}	λ_{max}	W	λ_{max}
3.53	RT	(0.718)[+]		(0.834)	(0.902)	(1.000)		
		0.685	0.34					
		0.689	0.35					
		0.692	0.41					
		0.695						
	NT	0.661	0.19					
		0.663	0.21					
		0.664	0.22					
		0.673	0.26					
		0.675						
		0.676						
	HT	0.659	0.14	0.810	0.905	1.010		
		0.666	0.18					
		0.674						

* Values were taken from Ref. [69].

[+] Values given in parentheses are calculated from the Ivey relations [70].

F band $\lambda_{max} = 703\ d^{1.84}$ for NaCl structure, $\lambda_{max} = 251\ d^{2.5}$ for CsCl structure.

R band $\lambda_{max} = 816\ d^{1.84}$

R band $\lambda_{max} = 884\ d^{1.84}$

M band $\lambda_{max} = 1400\ d^{1.56}$

TABLE 62. RECOMMENDED VALUES ON ABSORPTION COEFFICIENT OF POTASSIUM IODIDE IN IR REGION AT 300 K

ν, cm^{-1}	λ, μm	Absorption Coefficient, cm^{-1}	
		Intrinsic*	Observed† (Selected)
2.000E+02	50.0	1.4E+1	
2.440E+02	41.0	4.1E+0	3.6E+0
2.490E+02	40.2	3.5E+0	2.7E+0
2.640E+02	37.9	2.3E+0	2.4E+0
2.690E+02	37.2	2.0E+0	1.8E+0
2.830E+02	35.3	1.3E+0	1.2E+0
2.900E+02	34.5	1.1E+0	9.8E-1
3.030E+02	33.0	7.6E-1	7.8E-1
3.070E+02	32.6	6.8E-1	6.2E-1
3.240E+02	30.9	4.2E-1	4.9E-1
3.320E+02	30.1	3.3E-1	3.5E-1
3.420E+02	29.2	2.5E-1	2.6E-1
3.540E+02	28.2	1.7E-1	2.2E-1
3.630E+02	27.5	1.3E-1	1.6E-1
3.730E+02	26.8	1.0E-1	1.2E-1
3.830E+02	26.1	7.8E-2	5.7E-2
3.930E+02	25.4	5.8E-2	5.4E-2
4.020E+02	24.9	4.5E-2	4.3E-2
4.120E+02	24.3	3.4E-2	2.9E-2
4.220E+02	23.7	2.5E-2	2.2E-2
4.320E+02	23.1	1.9E-2	1.5E-2
4.410E+02	22.7	1.5E-2	1.3E-2
4.510E+02	22.2	1.1E-2	1.0E-2
4.580E+02	21.8	9.2E-3	7.5E-3
4.680E+02	21.4	6.9E-3	6.7E-3
4.830E+02	20.7	4.5E-3	6.0E-3
4.950E+02	20.2	3.2E-3	4.5E-3
5.000E+02	20.0	2.7E-3	
6.000E+02	16.7	1.6E-4	
7.000E+02	14.3	9.3E-6	
8.000E+02	12.5	5.4E-7	
9.000E+02	11.1	3.1E-8	
9.434E+02	10.6	9.1E-9	
1.000E+03	10.0	1.8E-9	

*Intrinsic values were calculated according to Eq. (38) with uncertainties about ±10%.

†Values in this column are the total absorption coefficient which are either lowest reported or those used to define the constants in Eq. (38). Uncertainties of these values are about ±10%. Values lower than 1.0E-3 carry higher uncertainties up to ±30%.

3.7. Cesium Iodide, CsI

Early measurements on the refractive index of CsI were made by Sprockhoff [140] in 1904, using a minimum deviation method for three visible spectral lines, 0.486, 0.589, and 0.656 μm. These three values were the only available data for about 50 years. The main reason for such a long period of inactivity was the difficulty in growing adequate CsI crystals. Large and good quality crystals, suitable for optical components, were not available; also, the need for infrared transparency was not generally felt.

It was not until 1955 that the refractive index for a wide range of transmission (0.129 to 53 μm) was measured by Rodney [151] on several cesium iodide samples grown by the Harshaw Chemical Company. The temperature coefficients of the refractive index were determined for each wavelength and all data were reduced to 297 K. Rodney adopted a dispersion equation of the Sellmeier type, simplified to five terms, to fit the reduced data.

In the ultraviolet region, 0.20-0.25 μm, Lamatsch et al. [152] derived the refractive indices from information on the transmission and reflection spectra. Since they used vacuum-evaporated thin film samples, the wavelengths of the two absorption bands obtained are higher than that of the bulk material. The large discrepancies between this set of data and that calculated from Rodney's work are to be expected.

Values of the refractive index beyond the transparent region, in the infrared, were obtained by Vergnat et al. [26] in 1969, by analyzing the reflection spectrum. They found that the wavelengths of infrared absorption bands are 117.65 and 161.29 μm at room temperature. One of the two is in close agreement with that of Rodney, which predominantly contributes to the absorption. Li [33] reduced the experimental data then available to a common temperature of 293 K and after careful analysis, generated a Sellmeier type formula representing the refractive index of CsI at 293 K in the spectral region between 0.25 and 67 μm,

$$n = 1.27587 + \frac{0.68689\ \lambda^2}{\lambda^2-(0.130)^2} + \frac{0.26090\ \lambda^2}{\lambda^2-(0.147)^2} + \frac{0.06256\ \lambda^2}{\lambda^2-(0.163)^2} + \frac{0.06527\ \lambda^2}{\lambda^2-(0.177)^2}$$
$$+ \frac{0.14991}{\lambda^2-(0.185)^2} + \frac{0.51818}{\lambda^2-(0.206)^2} + \frac{0.01918}{\lambda^2-(0.218)^2} + \frac{3.38229}{\lambda^2-(161.29)^2} \quad (39)$$

where λ is in units of μm.

Available da'a on the absorption coefficient, reflectivity, and transmission of CsI compiled in the present work are given in Tables 63 to 70 and are plotted in Figures 39 to 44. Investigations of absorption coefficient for practical applications are generally classified into three spectral regions: the ultraviolet and infrared absorption edges, and the transparent regions. In the case of CsI, available data in these regions are very limited. In the ultraviolet absorption edge region, Philipp and Taft [153] reported their absorption measurements for evaporated films of CsI. Their results were in reasonable agreement with earlier observation of Hilsch and Pohl [19] and Schneider and O'Bryan [20]. Lamatsch et al. [152] measured absorption coefficient for CsI film in the excitonic region, their results in the absorption edge were in concordance with those of Philipp and Taft [153].

In the multiphonon absorption region, Beairsto and Eldridge [154] determined absorption coefficient for CsI by measuring the transmission of samples of various thicknesses using a Fourier spectrophotometer. They found that the most reliable values of the absorption coefficient, α, were obtained when the thickness of the sample, d, was such that $\alpha d = 1.0$. As CsI does not cleave, the samples were cut with a wire saw and then carefully polished. With appropriate care, they found that the samples, stored over long periods, showed little deterioration.

As shown in Figures 39 to 44, the optical properties of CsI behave similarly as the other members of alkali ahlides. Although it is clearly suggested that in both of the absorption edges the exponential dependence of the absorption coefficient on frequency should hold, data at hand are insufficient to define unique solutions. As a result, it is not feasible to report recommended values, and only measurement information and original data are presented here in Tables 63 to 71.

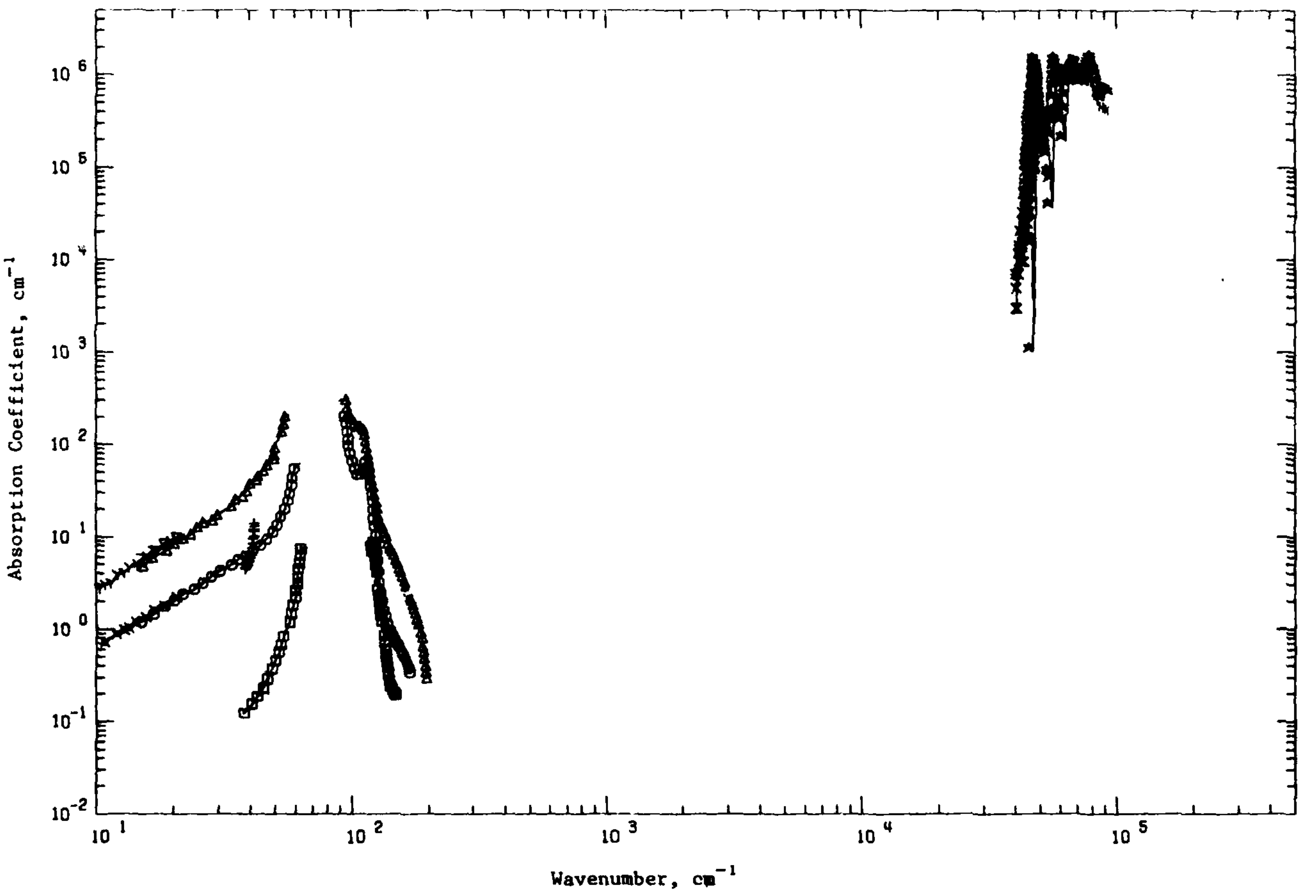

Figure 39. Absorption Coefficient of Cesium Iodide (Wavenumber Dependence)

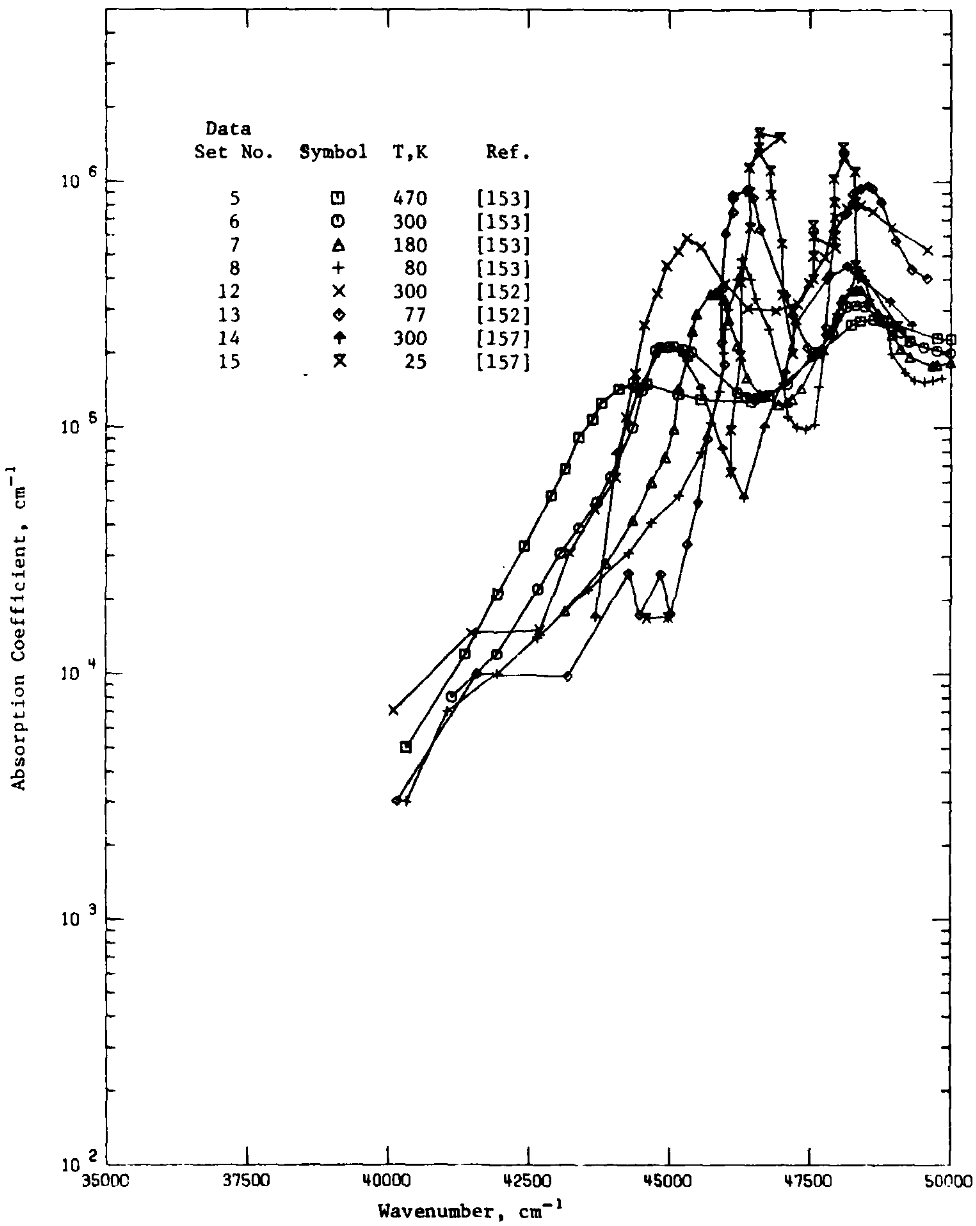

Figure 40. Absorption Coefficient of Cesium Iodide in the Urbach Tail Region

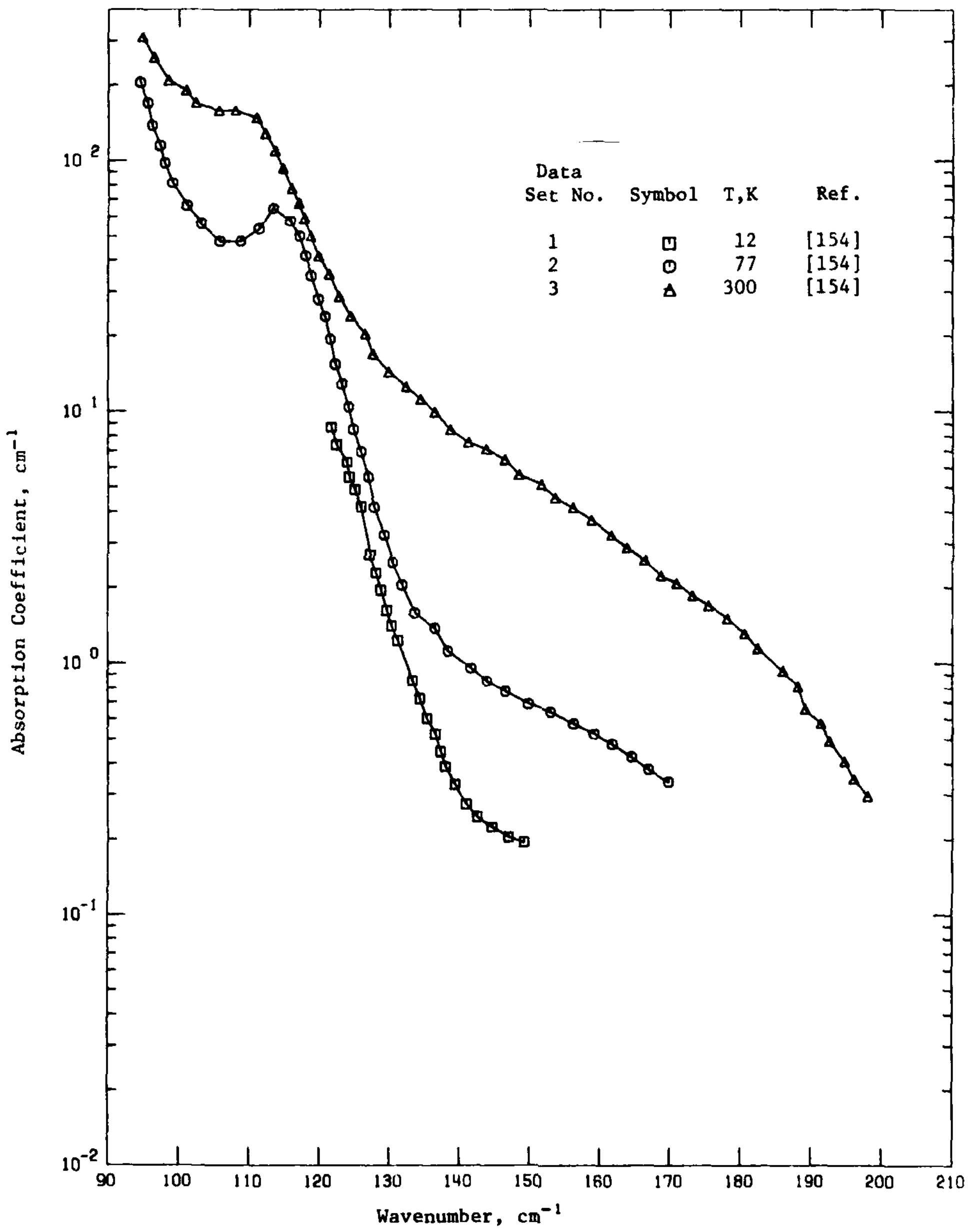

Figure 41. Absorption Coefficient of Cesium Iodide in the Multiphonon Region

TABLE 63. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF CESIUM IODIDE (Wavenumber Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	154	Beairsto, J.A.B. and Eldridge, J.E.	1973	T	3.79×10^{1}-1.49×10^{2}	12	Single crystal; plate specimens of different thickness; mechanically and chemically polished; transmittance spectra obtained and absorption coefficients deduced; absorption-coefficient data extracted from a figure.
2	154	Beairsto, J.A.B. and Eldridge, J.E.	1973	T	1.5×10^{1}-1.7×10^{2}	77	Same as above except at a higher temperature.
3	154	Beairsto, J.A.B. and Eldridge, J.E.	1973	T	1.5×10^{1}-2.0×10^{2}	300	Same as above except at a higher temperature.
4	155	Mitolidi, E.N., Neklyudov, I.M., and Panova, A.N.	1974	T	3.8×10^{1}-4.2×10^{1}	300	Single crystal; grown in evacuated quartz vials by the Stockbarger method from melt of pure salts; 2.5 x 3 x 8 mm specimen; mechanically ground and chemically polished; annealed for six hours at 773.15 K; absorption-coefficient data taken from a figure.
5	153	Philipp, H. and Taft, E.	1956	R	4.03×10^{4}-5.4×10^{4}	470	Pure CsI; obtained from the Fairmount Chemical Co.; thin film specimens evaporated onto a sapphire substrate; absorption coefficients measured; data extracted from a figure.
6	153	Philipp, H. and Taft, E.	1956	R	4.1×10^{4}-5.4×10^{4}	300	Similar to above except at a lower temperature.
7	153	Philipp, H. and Taft, E.	1956	R	4.3×10^{4}-5.4×10^{4}	180	Similar to above except at a lower temperature.
8	153	Philipp, H. and Taft, E.	1956	R	4.0×10^{4}-5.4×10^{4}	80	Similar to above except at a lower temperature.
9	156	Dianov, E.M.	1967	T	1.5×10^{1}-2.1×10^{1}	293	Single crystal; plane-parallel plate or disk specimens of 50-80 mm diameter and various thicknesses; average absorption coefficients determined from the measured values of transmission in the absence of internal interference; data extracted from a figure.
10	156	Dianov, E.M.	1967	R	7.27-20.8	293	Same as above.
11	156	Dianov, E.M.	1967	R	7.25-20.8	78	Similar to above except at a lower temperature.
12	152	Lamatsch, H., Rossel, J., and Saurer, E.	1972	Z	4.0×10^{4}-5.0×10^{4}	300	Thin film specimen; evaporated on suprasil quartz substrate; absorption coefficients deduced from transmission and reflectivity measurements; data extracted from a figure.
13	152	Lamatsch, H., et al.	1972	Z	4.0×10^{4}-5.0×10^{4}	77	Same as above except at a lower temperature.

TABLE 63. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF CESIUM IODIDE (Wavenumber Dependence) (continued)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
14	157	Said, K.I. and Green, G.W.	1977	R	4.3×10^{4}-9.2×10^{4}	300	Crystal; mechanically polished in mineral oil then rinsed and kept at 10^{-6} Torr; annealed at 400 K for several hours before measurement; reflection spectrum taken and analyzed by the Kramers-Kronig relation to obtain absorption coefficients; data extracted from a figure.
15	157	Said, K.I. and Green, G.W.	1977	R	4.4×10^{4}-9.2×10^{4}	25	Same as above.
16	108	Dianov, E.M. and Irisova, N.A.	1966	T	5	298	Natural crystal; plate specimen of 3.5 and 22 mm thick; absorption coefficient determined from transmission measurement; data extracted from a table.

TABLE 64. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF CESIUM IODIDE (Wavenumber Dependence)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

ν	α	ν	α	ν	α	ν	α	ν	α	ν	α
DATA SET 1		DATA SET 1(CONT.)		DATA SET 2(CONT.)		DATA SET 3		DATA SET 3(CONT.)		DATA SET 4	
T = 12.0						T = 300.0				T = 300.0	
		5.030E+1	4.571E-1	1.172E+2	5.012E+1			1.170E+2	6.761E+1		
1.432E+2	1.350E-1	4.850E+1	3.715E-1	1.159E+2	5.754E+1	1.931E+2	2.951E-1	1.160E+2	7.762E+1	4.161E+1	1.415E+1
1.470E+2	2.042E-1	4.710E+1	2.884E-1	1.134E+2	6.457E+1	1.961E+2	3.467E-1	1.148E+2	9.333E+1	4.159E+1	1.311E+1
1.447E+2	2.239E-1	4.530E+1	2.291E-1	1.115E+2	5.370E+1	1.943E+2	4.074E-1	1.1[illegible]E+2	1.095E+2	4.153E+1	1.206E+1
1.426E+2	2.455E-1	4.250E+1	1.862E-1	1.098E+2	4.786E+1	1.927E+2	4.398E-1	1.123E+2	1.288E+2	4.151E+1	1.152E+1
1.411E+2	2.754E-1	4.080E+1	1.549E-1	1.059E+2	4.786E+1	1.914E+2	5.754E-1	1.111E+2	1.479E+2	4.137E+1	1.066E+1
1.394E+2	3.311E-1	3.790E+1	1.230E-1	1.032E+2	5.623E+1	1.892E+2	6.607E-1	1.080E+2	1.385E+2	4.129E+1	9.470E+0
1.391E+2	3.890E-1			1.011E+2	6.607E+1	1.882E+2	8.128E-1	1.457E+2	1.585E+2	4.114E+1	8.480E+0
1.374E+2	4.467E-1	DATA SET 2		9.910E+1	8.128E+1	1.860E+2	9.333E-1	1.024E+2	1.698E+2	4.093E+1	7.620E+0
1.357E+2	5.248E-1	T = 77.0		9.830E+1	9.772E+1	1.825E+2	1.148E+0	1.012E+2	1.905E+2	4.081E+1	6.720E+0
1.354E+2	6.026E-1			9.730E+1	1.148E+2	1.806E+2	1.318E+0	9.350E+1	2.089E+2	4.065E+1	6.230E+0
1.344E+2	7.244E-1	1.694E+2	3.388E-1	9.620E+1	1.380E+2	1.782E+2	1.514E+0	9.650E+1	2.570E+2	4.043E+1	5.920E+0
1.334E+2	8.511E-1	1.670E+2	3.802E-1	9.560E+1	1.698E+2	1.755E+2	1.698E+0	9.490E+1	3.090E+2	4.000E+1	5.500E+0
1.313E+2	1.230E+0	1.646E+2	4.266E-1	9.450E+1	2.042E+2	1.732E+2	1.862E+0	5.510E+1	2.042E+2	3.960E+1	5.250E+0
1.304E+2	1.413E+0	1.619E+2	4.786E-1	5.970E+1	5.495E+1	1.710E+2	2.089E+0	5.420E+1	1.660E+2	3.939E+1	4.970E+0
1.297E+2	1.622E+0	1.593E+2	5.248E-1	5.870E+1	4.365E+1	1.688E+2	2.239E+0	5.320E+1	1.380E+2	3.909E+1	4.850E+0
1.289E+2	1.995E+0	1.563E+2	5.754E-1	5.830E+1	3.631E+1	1.665E+2	2.570E+0	5.340E+1	9.333E+1	3.870E+1	4.600E+0
1.282E+2	2.239E+0	1.530E+2	6.457E-1	5.720E+1	2.951E+1	1.638E+2	2.884E+0	4.980E+1	7.762E+1	3.846E+1	4.470E+0
1.273E+2	2.512E+0	1.493E+2	6.310E-1	5.620E+1	2.455E+1	1.616E+2	3.236E+0	4.930E+1	7.079E+1		
1.260E+2	4.169E+0	1.460E+2	7.762E-1	5.490E+1	1.995E+1	1.555E+2	3.715E+0	4.650E+1	6.026E+1	DATA SET 5	
1.251E+2	4.333E+0	1.440E+2	8.511E-1	5.300E+1	1.661E+1	1.562E+2	4.169E+0	4.550E+1	5.248E+1	T = 470.0	
1.243E+2	5.435E+0	1.417E+2	9.550E-1	5.120E+1	1.349E+1	1.536E+2	4.571E+0	4.310E+1	4.571E+1		
1.242E+2	6.310E+0	1.344E+2	1.122E+0	4.940E+1	1.122E+1	1.517E+2	5.129E+0	4.250E+1	4.169E+1	5.403E+4	2.430E+5
1.225E+2	7.413E+0	1.306E+2	1.380E+0	4.600E+1	9.333E+0	1.435E+2	5.623E+0	4.010E+1	3.802E+1	5.331E+4	3.720E+5
1.217E+2	8.710E+0	1.337E+2	1.585E+0	4.420E+1	8.128E+0	1.465E+2	6.457E+0	3.880E+1	3.162E+1	5.323E+4	3.770E+5
6.760E+1	7.413E+0	1.319E+2	2.042E+0	4.110E+1	7.079E+0	1.439E+2	7.079E+0	3.740E+1	2.754E+1	5.300E+4	3.730E+5
6.310E+1	7.413E+0	1.306E+2	2.512E+0	3.800E+1	6.165E+0	1.413E+2	7.586E+0	3.500E+1	2.512E+1	5.282E+4	3.750E+5
6.312E+1	6.310E+0	1.293E+2	3.226E+0	3.630E+1	5.623E+0	1.337E+2	8.511E+0	3.390E+1	2.138E+1	5.251E+4	3.570E+5
6.280E+1	5.248E+0	1.279E+2	4.169E+0	3.410E+1	4.898E+0	1.355E+2	1.000E+1	2.990E+1	1.738E+1	5.261E+4	2.870E+5
6.210E+1	4.467E+0	1.270E+2	5.495E+0	3.070E+1	4.266E+0	1.345E+2	1.122E+1	2.860E+1	1.514E+1	5.105E+4	2.540E+5
6.170E+1	3.631E+0	1.260E+2	6.918E+0	2.840E+1	3.715E+0	1.324E+2	1.259E+1	2.640E+1	1.445E+1	5.048E+4	2.350E+5
6.170E+1	3.090E+0	1.249E+2	8.511E+0	2.630E+1	3.162E+0	1.299E+2	1.445E+1	2.490E+1	1.259E+1	5.024E+4	2.230E+5
6.050E+1	2.630E+0	1.242E+2	1.047E+1	2.430E+1	2.692E+0	1.277E+2	1.698E+1	2.350E+1	1.072E+1	5.000E+4	2.230E+5
6.000E+1	2.239E+0	1.235E+2	1.288E+1	2.190E+1	2.399E+0	1.266E+2	2.042E+1	2.200E+1	9.550E+0	4.970E+4	2.300E+5
5.890E+1	1.820E+0	1.223E+2	1.549E+1	2.020E+1	2.042E+0	1.245E+2	2.399E+1	2.130E+1	8.511E+0	4.887E+4	2.693E+5
5.910E+1	1.479E+0	1.216E+2	1.950E+1	1.806E+1	1.738E+0	1.229E+2	2.884E+1	1.900E+1	7.079E+0	4.879E+4	2.730E+5
5.720E+1	1.202E+0	1.208E+2	2.399E+1	1.680E+1	1.445E+0	1.215E+2	3.548E+1	1.670E+1	5.888E+0	4.863E+4	2.740E+5
5.390E+1	8.315E-1	1.199E+2	2.938E+1	1.500E+1	1.202E+0	1.199E+2	4.169E+1	1.530E+1	4.786E+0	4.839E+4	2.720E+5
5.280E+1	6.761E-1	1.189E+2	3.467E+1			1.188E+2	5.012E+1			4.823E+4	2.620E+5
5.190E+1	5.623E-1	1.181E+2	4.169E+1			1.179E+2	5.888E+1			4.677E+4	1.350E+5

TABLE 64. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF CESIUM IODIDE (Wavenumber Dependence) (continued)

DATA SET 5(CONT.)

ν	α
4.645E+4	1.270E+5
4.556E+4	1.300E+5
4.516E+4	1.370E+5
4.450E+4	1.500E+5
4.435E+4	1.520E+5
4.411E+4	1.430E+5
4.379E+4	1.200E+5
4.352E+4	1.050E+5
4.335E+4	9.100E+4
4.315E+4	6.800E+4
4.290E+4	5.300E+4
4.242E+4	3.300E+4
4.194E+4	2.100E+4
4.137E+4	1.200E+4
4.032E+4	5.000E+3

DATA SET 6
T = 300.0

ν	α
5.403E+4	3.730E+5
5.371E+4	3.820E+5
5.355E+4	3.530E+5
5.301E+4	3.600E+5
5.226E+4	3.000E+5
5.092E+4	2.190E+5
5.140E+4	2.030E+5
5.000E+4	2.010E+5
4.970E+4	2.050E+5
4.952E+4	2.130E+5
4.927E+4	2.240E+5
4.911E+4	2.440E+5
4.871E+4	2.810E+5
4.847E+4	3.120E+5
4.831E+4	3.140E+5
4.815E+4	3.110E+5
4.790E+4	2.420E+5
4.758E+4	2.020E+5
4.710E+4	1.500E+5
4.665E+4	1.340E+5
4.653E+4	1.320E+5

DATA SET 6(CONT.)

ν	α
4.637E+4	1.320E+5
4.621E+4	1.390E+5
4.540E+4	2.030E+5
4.524E+4	2.080E+5
4.508E+4	2.150E+5
4.500E+4	2.150E+5
4.484E+4	2.120E+5
4.470E+4	2.060E+5
4.452E+4	1.420E+5
4.435E+4	1.000E+5
4.395E+4	6.300E+4
4.371E+4	5.000E+4
4.339E+4	3.900E+4
4.306E+4	3.100E+4
4.260E+4	2.200E+4
4.194E+4	1.200E+4
4.113E+4	8.000E+3

DATA SET 7
T = 180.0

ν	α
5.403E+4	4.080E+5
5.395E+4	4.020E+5
5.347E+4	3.570E+5
5.292E+4	3.340E+5
5.234E+4	2.780E+5
5.161E+4	2.510E+5
5.121E+4	2.350E+5
5.065E+4	2.110E+5
5.000E+4	1.840E+5
4.979E+4	1.800E+5
4.964E+4	1.790E+5
4.927E+4	1.940E+5
4.911E+4	2.090E+5
4.895E+4	2.400E+5
4.871E+4	2.910E+5
4.855E+4	3.280E+5
4.839E+4	3.630E+5
4.831E+4	3.630E+5
4.823E+4	3.620E+5

DATA SET 7(CONT.)

ν	α
4.806E+4	3.350E+5
4.798E+4	2.860E+5
4.766E+4	2.010E+5
4.734E+4	1.450E+5
4.718E+4	1.310E+5
4.710E+4	1.270E+5
4.694E+4	1.240E+5
4.661E+4	1.370E+5
4.637E+4	1.590E+5
4.621E+4	2.160E+5
4.605E+4	2.740E+5
4.597E+4	3.320E+5
4.589E+4	3.510E+5
4.581E+4	3.540E+5
4.573E+4	3.490E+5
4.548E+4	2.890E+5
4.540E+4	2.470E+5
4.532E+4	1.950E+5
4.516E+4	1.450E+5
4.508E+4	9.900E+4
4.492E+4	7.000E+4
4.468E+4	6.000E+4
4.435E+4	4.200E+4
4.387E+4	2.800E+4
4.315E+4	1.800E+4

DATA SET 8
T = 80.0

ν	α
5.403E+4	3.780E+5
5.323E+4	3.010E+5
5.250E+4	2.570E+5
5.161E+4	2.240E+5
5.121E+4	2.220E+5
5.089E+4	2.190E+5
5.073E+4	2.130E+5
5.008E+4	1.590E+5
4.984E+4	1.590E+5
4.968E+4	1.560E+5
4.952E+4	1.540E+5

DATA SET 8(CONT.)

ν	α
4.935E+4	1.560E+5
4.919E+4	1.680E+5
4.895E+4	2.000E+5
4.871E+4	2.560E+5
4.855E+4	3.340E+5
4.847E+4	3.990E+5
4.839E+4	4.360E+5
4.831E+4	4.300E+5
4.823E+4	3.050E+5
4.798E+4	2.900E+5
4.790E+4	2.300E+5
4.774E+4	2.000E+5
4.766E+4	1.470E+5
4.758E+4	1.030E+5
4.742E+4	9.900E+4
4.726E+4	1.020E+5
4.710E+4	1.110E+5
4.702E+4	1.520E+5
4.677E+4	2.510E+5
4.653E+4	3.360E+5
4.645E+4	4.010E+5
4.629E+4	4.850E+5
4.629E+4	4.400E+5
4.621E+4	4.010E+5
4.605E+4	3.630E+5
4.597E+4	2.520E+5
4.597E+4	2.010E+5
4.589E+4	1.400E+5
4.573E+4	1.040E+5
4.556E+4	7.900E+4
4.516E+4	5.300E+4
4.468E+4	4.100E+4
4.427E+4	3.100E+4
4.355E+4	2.000E+4
4.266E+4	1.400E+4
4.194E+4	1.000E+4
4.105E+4	7.000E+3
4.032E+4	3.000E+3

DATA SET 9
T = 293.0

ν	α
2.358E+1	9.748E+0
1.945E+1	8.248E+0
1.669E+1	6.965E+0
1.511E+1	5.752E+0

DATA SET 10
T = 293.0

ν	α
2.375E+1	9.360E+0
1.984E+1	8.677E+0
1.802E+1	7.663E+0
1.715E+1	6.769E+0
1.590E+1	6.013E+0
1.453E+1	4.909E+0
1.350E+1	4.528E+0
1.292E+1	3.994E+0
1.217E+1	3.837E+0
1.143E+1	3.095E+0
1.089E+1	2.999E+0
1.031E+1	2.705E+0
9.862E+0	2.528E+0
9.515E+0	2.320E+0
8.945E+0	2.181E+0
8.365E+0	1.672E+0
7.273E+0	1.545E+0

DATA SET 11
T = 78.0

ν	α
2.375E+1	2.216E+0
1.835E+1	1.795E+0
1.689E+1	1.592E+0
1.565E+1	1.337E+0
1.433E+1	1.170E+0
1.342E+1	1.011E+0
1.265E+1	9.691E-1
1.199E+1	8.739E-1
1.078E+1	7.177E-1
9.993E+0	6.462E-1

DATA SET 11(CONT.)

ν	α
8.096E+0	5.136E-1
7.257E+0	3.648E-1

DATA SET 12
T = 300.0

ν	α
4.954E+4	5.289E+5
4.935E+4	6.520E+5
4.862E+4	7.520E+5
4.846E+4	8.005E+5
4.825E+4	7.793E+5
4.794E+4	7.103E+5
4.776E+4	4.327E+5
4.745E+4	3.854E+5
4.725E+4	3.137E+5
4.691E+4	3.000E+5
4.604E+4	3.556E+5
4.595E+4	3.842E+5
4.550E+4	5.427E+5
4.531E+4	5.856E+5
4.515E+4	5.219E+5
4.490E+4	4.550E+5
4.478E+4	3.560E+5
4.456E+4	2.615E+5
4.435E+4	1.657E+5
4.423E+4	1.100E+5
4.402E+4	6.256E+4
4.367E+4	4.604E+4
4.323E+4	3.097E+4
4.271E+4	1.502E+4
4.143E+4	1.459E+4
4.012E+4	7.094E+3

DATA SET 13
T = 77.0

ν	α
4.955E+4	4.296E+5
4.931E+4	4.387E+5
4.902E+4	5.753E+5
4.870E+4	8.241E+5

TABLE 64. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF CESIUM IODIDE (Wavenumber Dependence) (continued)

DATA SET 13 (CONT.)

ν	α
4.861E+4	9.341E+5
4.854E+4	9.559E+5
4.840E+4	9.335E+5
4.826E+4	8.934E+5
4.820E+4	8.157E+5
4.812E+4	7.305E+5
4.792E+4	6.310E+5
4.765E+4	4.179E+5
4.778E+4	2.553E+5
4.778E+4	2.334E+5
4.771E+4	2.044E+5
4.753E+4	1.950E+5
4.746E+4	2.127E+5
4.719E+4	2.004E+5
4.700E+4	3.442E+5
4.672E+4	6.392E+5
4.649E+4	8.011E+5
4.639E+4	9.163E+5
4.613E+4	8.737E+5
4.613E+4	6.544E+5
4.613E+4	7.477E+5
4.580E+4	6.144E+5
4.593E+4	3.083E+5
4.593E+4	2.217E+5
4.598E+4	1.813E+5
4.569E+4	9.071E+4
4.551E+4	4.974E+4
4.531E+4	3.359E+4
4.512E+4	1.754E+4
4.484E+4	2.550E+4
4.445E+4	1.733E+4
4.427E+4	2.559E+4
4.310E+4	9.771E+3
4.159E+4	9.928E+3
4.116E+4	3.023E+3

DATA SET 14
T = 300.0

ν	α
9.188E+4	4.157E+5

DATA SET 14 (CONT.)

ν	α
8.981E+4	4.345E+5
8.794E+4	4.542E+5
8.531E+4	4.664E+5
8.344E+4	5.402E+5
8.155E+4	6.938E+5
7.966E+4	8.403E+5
7.835E+4	9.599E+5
7.685E+4	8.875E+5
7.610E+4	8.778E+5
7.572E+4	8.992E+5
7.384E+4	9.251E+5
7.196E+4	9.495E+5
7.033E+4	9.813E+5
6.970E+4	1.055E+6
6.876E+4	1.188E+6
6.813E+4	1.201E+6
6.751E+4	1.357E+6
6.705E+4	1.457E+6
6.630E+4	1.403E+6
6.555E+4	1.491E+6
6.535E+4	1.487E+6
6.441E+4	1.450E+6
6.405E+4	1.323E+6
6.349E+4	1.267E+6
6.275E+4	1.209E+6
6.234E+4	1.115E+6
6.201E+4	1.023E+6
6.165E+4	8.467E+5
6.122E+4	6.939E+5
6.032E+4	5.425E+5
6.054E+4	5.181E+5
6.017E+4	4.317E+5
6.019E+4	3.902E+5
5.942E+4	4.256E+5
5.829E+4	4.709E+5
5.810E+4	5.549E+5
5.752E+4	6.679E+5
5.714E+4	8.207E+5
5.657E+4	9.285E+5
5.619E+4	9.011E+5

DATA SET 14 (CONT.)

ν	α
5.564E+4	8.739E+5
5.527E+4	7.917E+5
5.490E+4	7.455E+5
5.415E+4	7.192E+5
5.303E+4	5.571E+5
5.304E+4	4.112E+5
5.230E+4	2.971E+5
5.156E+4	2.034E+5
5.099E+4	2.358E+5
5.006E+4	2.309E+5
4.931E+4	2.619E+5
4.892E+4	3.258E+5
4.835E+4	4.053E+5
4.816E+4	4.533E+5
4.779E+4	4.000E+5
4.724E+4	2.648E+5
4.706E+4	1.668E+5
4.669E+4	1.009E+5
4.632E+4	5.181E+4
4.594E+4	5.256E+4
4.556E+4	1.449E+5
4.518E+4	2.055E+5
4.481E+4	2.033E+5
4.444E+4	1.402E+5
4.406E+4	7.808E+4
4.369E+4	1.712E+4

DATA SET 15
T = 25.0

ν	α
9.186E+4	7.017E+5
8.963E+4	7.456E+5
8.777E+4	7.599E+5
8.683E+4	7.507E+5
8.553E+4	7.094E+5
8.442E+4	6.110E+5
8.330E+4	6.605E+5
8.236E+4	8.823E+5
8.161E+4	1.102E+6
8.106E+4	1.180E+6

DATA SET 15 (CONT.)

ν	α
8.037E+4	1.233E+6
7.919E+4	1.262E+6
7.863E+4	1.500E+6
7.806E+4	1.598E+6
7.702E+4	1.644E+6
7.732E+4	1.582E+6
7.640E+4	1.456E+6
7.509E+4	1.336E+6
7.473E+4	1.241E+6
7.380E+4	1.174E+6
7.305E+4	1.136E+6
7.231E+4	1.023E+6
7.194E+4	9.175E+5
7.138E+4	9.095E+5
7.064E+4	9.249E+5
6.971E+4	8.383E+5
6.859E+4	1.041E+6
6.821E+4	1.226E+6
6.783E+4	1.384E+6
6.727E+4	1.407E+6
6.653E+4	1.357E+6
6.616E+4	1.211E+6
6.598E+4	1.162E+6
6.560E+4	1.155E+6
6.523E+4	1.035E+6
6.468E+4	9.574E+5
6.449E+4	9.093E+5
6.412E+4	9.492E+5
6.374E+4	1.077E+6
6.356E+4	1.141E+6
6.319E+4	1.201E+6
6.318E+4	1.221E+6
6.281E+4	1.214E+6
6.231E+4	1.154E+6
6.253E+4	1.014E+6
6.226E+4	9.208E+5
6.244E+4	9.236E+5
6.207E+4	9.611E+5
6.189E+4	1.023E+6
6.170E+4	6.692E+5

DATA SET 15 (CONT.)

ν	α
6.134E+4	6.459E+5
6.134E+4	4.571E+5
6.078E+4	3.469E+5
6.002E+4	2.180E+5
5.948E+4	3.310E+5
5.873E+4	4.183E+5
5.817E+4	5.343E+5
5.760E+4	8.506E+5
5.741E+4	1.185E+6
5.722E+4	1.384E+6
5.665E+4	1.469E+6
5.628E+4	1.557E+6
5.573E+4	1.347E+6
5.555E+4	1.032E+6
5.556E+4	8.195E+5
5.501E+4	6.000E+5
5.482E+4	4.253E+5
5.446E+4	2.327E+5
5.409E+4	8.020E+4
5.335E+4	4.150E+4
5.298E+4	9.653E+4
5.200E+4	1.567E+5
5.185E+4	1.844E+5
5.111E+4	2.351E+5
5.018E+4	3.009E+5
4.925E+4	2.259E+5
4.906E+4	2.590E+5
4.831E+4	4.577E+5
4.830E+4	8.205E+5
4.829E+4	1.093E+6
4.810E+4	1.244E+6
4.809E+4	1.378E+6
4.812E+4	1.261E+6
4.792E+4	1.022E+6
4.793E+4	8.221E+5
4.794E+4	6.645E+5
4.794E+4	5.373E+5
4.756E+4	5.994E+5
4.756E+4	6.657E+5
4.756E+4	5.803E+5

DATA SET 15 (CONT.)

ν	α
4.750E+4	4.035E+5
4.720E+4	2.334E+5
4.720E+4	1.999E+5
4.731E+4	3.402E+5
4.700E+4	5.599E+5
4.681E+4	8.540E+5
4.681E+4	1.113E+6
4.600E+4	1.300E+6
4.697E+4	1.510E+6
4.660E+4	1.579E+6
4.661E+4	1.394E+6
[illegible]	1.235E+6
4.642E+4	1.135E+6
4.643E+4	9.030E+5
4.644E+4	6.502E+5
4.627E+4	3.390E+5
4.627E+4	1.994E+5
4.639E+4	9.758E+4
4.609E+4	6.003E+4
[illegible]	1.735E+4
4.535E+4	1.143E+3
4.458E+4	1.090E+4
4.460E+4	1.082E+4

DATA SET 16
T = 299.0

ν	α
[illegible]	6.472E-1

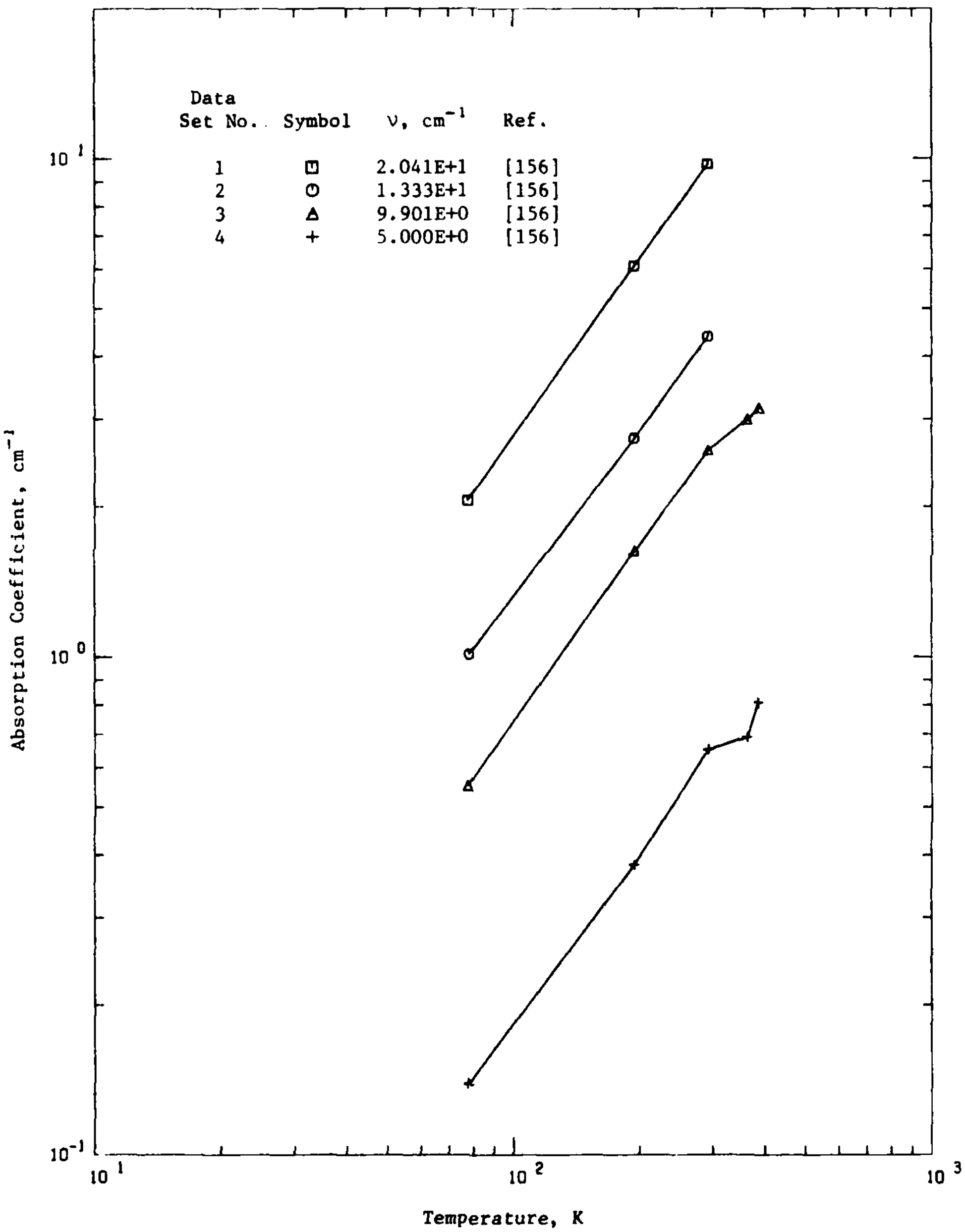

Figure 42. Absorption Coefficient of Cesium Iodide (Temperature Dependence)

TABLE 65. SUMMARY OF MEASUREMENTS ON THE ABSORPTION COEFFICIENT OF CESIUM IODIDE (Temperature Dependence)

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavenumber Range, cm^{-1}	Temperature Range, K	Specifications and Remarks
1	156	Dianov, E.M.	1967	T	20.41	78-292	Single crystal; plane-parallel plate or disk specimens of 30-50 mm diameter and various thicknesses; absorption coefficients determined from the measured transmission in the absence of internal interference; data extracted from a figure.
2	156	Dianov, E.M.	1967	T	13.33	78-292	Same as above except for a longer wavelength.
3	156	Dianov, E.M.	1967	T	99	78-387	Same as above except for a longer wavelength.
4	156	Dianov, E.M.	1967	T	5	78-386	Same as above except for a longer wavelength.

TABLE 66. EXPERIMENTAL DATA ON THE ABSORPTION COEFFICIENT OF CESIUM IODIDE (Temperature Dependence)

[Wavenumber, ν, cm^{-1}; Temperature, T, K; Absorption Coefficient, α, cm^{-1}]

T	α
DATA SET 1	
ν = 2.041E+1	
77.7	2.057E+0
194.7	6.391E+0
292.4	9.745E+0
DATA SET 2	
ν = 1.333E+1	
78.2	1.012E+0
194.7	2.741E+0
292.4	4.393E+0
DATA SET 3	
ν = 9.931E+0	
77.7	5.512E-1
194.7	1.629E+0
292.4	2.594E+0
362.7	2.931E+0
387.3	3.155E+0
DATA SET 4	
ν = 5.000E+0	
77.7	1.349E-1
194.7	3.926E-1
292.4	6.523E-1
362.7	6.924E-1
385.8	8.099E-1

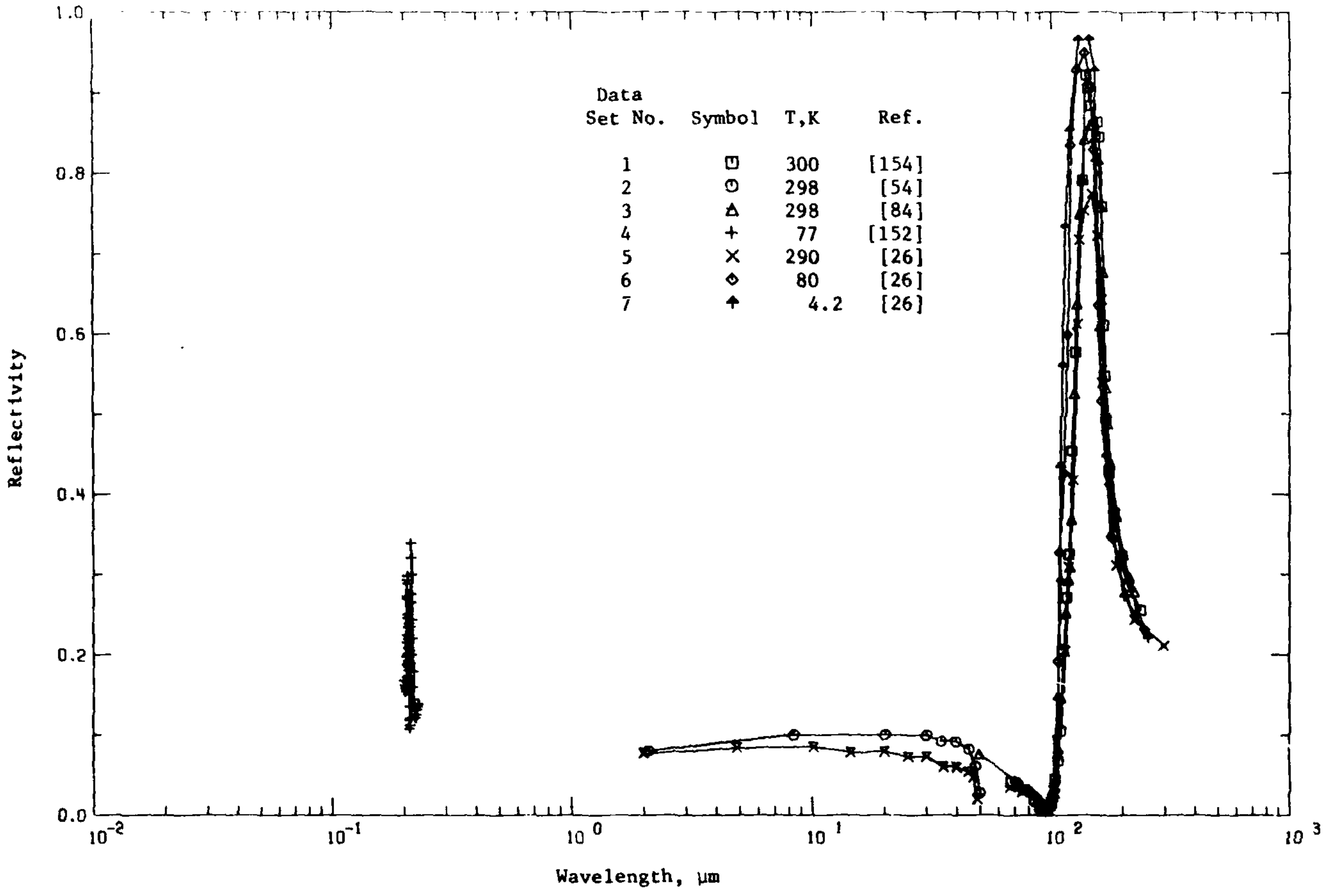

Figure 43. Reflectivity of Cesium Iodide

TABLE 67. SUMMARY OF MEASUREMENTS ON THE REFLECTIVITY OF CESIUM IODIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	154	Bealisto, J.A.B. and Eldridge, J.E.	1973	R	67.2-236.4	300	Single crystal; specimen with surface polished mechanically and then chemically; reflectivity measured; data extracted from a figure.
2	54	McCarthy, D.E.	1963	R	2.10-20.0	298	Synthetic crystal (1 cm thick); polished to flatness of seven fringes on both sides; 30° reflectivity measurements made with aluminum mirror reference standard; data extracted from a curve.
3	84	Mitsuishi, A., Yamada, Y., and Yoshinaga, H.	1962	R	49.7-223	298	Single crystal; near normal reflectivity measured in vacuum with aluminum reference standard; data extracted from a curve.
4	152	Lamatsch, H., Rosse, J., and Saurer, E.	1972	R	0.20-0.23	77	Single crystal; near normal reflectivity observed; data extracted from a curve.
5	26	Vergnat, P., Claudel, J., Hadni, A., and Strimer, P.	1969	R	66-297	290	CsI crystals; reflectivities at 15° incidence obtained; data extracted from a figure.
6	26	Vergnat, P. et al.	1969	R	82-246	80	Same as above.
7	26	Vergnat, P. et al.	1969	R	72-254	4.2	Same as above.

TABLE 68. EXPERIMENTAL DATA ON THE REFLECTIVITY OF CESIUM IODIDE

[Wavelength, λ, μm; Temperature, T, K; Reflectivity, ρ]

DATA SET 1
T = 300.0

λ	ρ
67.2	0.242
70.5	0.032
80.9	0.020
89.0	[illegible]
91.8	[illegible]
95.3	[illegible]
99.0	0.015
101.4	0.023
103.3	0.045
106.4	0.093
110.3	0.105
112.7	0.140
115.7	0.171
119.9	0.325
122.1	0.494
126.7	0.577
130.3	0.791
139.5	0.922
142.4	0.936
146.3	0.494
152.5	0.353
153.2	0.344
165.1	0.757
167.5	0.613
164.9	0.547
172.5	0.494
175.1	0.429
183.4	0.377
197.0	0.323
210.5	0.235
235.4	0.255

DATA SET 2
T = 294.0

λ	ρ
2.16	[illegible]
4.46	[illegible]
[illegible]	[illegible]
30.0	0.160
34.5	0.092
40.0	0.092
45.2	0.082
47.9	0.061
50.0	0.027

DATA SET 3
T = 300.0

λ	ρ
49.7	0.076
98.4	0.012
103.	0.035
107.	0.083
110.4	0.146
115.	0.252
118.	0.293
120.	0.309
122.	0.368
125.	0.506
128.	0.637
130.	0.749
134.	0.793
138.	0.842
145.	0.856
145.	[illegible]
152.	0.844
157.	0.916
160.	0.757
165.	0.676
170.	0.533
173.	0.488
174.	0.438
185.	0.373
200.	0.325
211.	0.297
223.	0.278

DATA SET 4
T = 77.0

λ	ρ
0.2000	0.163
0.2012	0.152
0.2021	0.159
0.2030	0.155
0.2037	0.155
0.2045	0.158
0.2049	0.173
0.2050	0.186
0.2052	0.198
0.2054	0.216
0.2056	0.246
0.2057	0.270
0.2059	0.293
0.2063	0.298
0.2066	0.289
0.2070	0.272
0.2074	0.246
0.2074	0.224
0.2076	0.201
0.2077	0.185
0.2079	0.181
0.2085	0.192
0.2085	0.199
0.2086	0.229
0.2088	0.233
0.2088	0.250
0.2094	0.259
0.2094	0.209
0.2096	0.190
0.2099	0.170
0.2103	0.151
0.2107	0.130
0.2110	0.119
0.2118	0.108
0.2121	0.112
0.2127	0.121
0.2130	0.130
0.2134	0.150
0.2136	0.194

DATA SET 4 (CONT.)

λ	ρ
0.2137	0.265
0.2141	0.235
0.2141	0.265
0.2145	0.300
0.2149	0.321
0.2154	0.339
0.2159	0.321
0.2163	0.306
0.2166	0.276
0.2170	0.244
0.2174	0.220
0.2177	0.200
0.2188	0.179
0.2194	0.159
0.2201	0.144
0.2205	0.138
0.2208	0.131
0.2214	0.125
0.2223	0.121
0.2234	0.121
0.2247	0.125
0.2261	0.131
0.2276	0.136
0.2297	0.138

DATA SET 5
T = 290.0

λ	ρ
66.7	0.035
73.6	0.029
90.3	0.017
95.7	0.006
[illegible]	0.007
107.5	0.074
114.3	0.164
118.9	0.349
123.6	0.418
129.5	0.612
131.7	0.717
137.4	0.753

DATA SET 5 (CONT.)

λ	ρ
148.3	0.774
157.4	0.721
162.2	0.642
164.4	0.533
175.5	0.427
186.4	0.312
222.4	0.243
297.1	0.211

DATA SET 6
T = 6.0

λ	ρ
81.7	0.023
87.5	0.014
96.1	0.003
102.1	0.039
105.5	0.097
106.7	0.191
108.1	0.327
113.2	0.420
117.5	0.593
120.7	0.835
127.1	0.929
137.9	0.950
146.0	0.908
150.4	0.829
157.1	0.635
162.0	0.515
179.3	0.347
246.4	0.231

DATA SET 7
T = 4.2

λ	ρ
72.1	0.004
78.3	0.032
85.6	0.023
91.5	0.014
96.6	0.024
101.7	0.030

DATA SET 7 (CONT.)

λ	ρ
106.3	0.144
109.3	0.291
115.4	0.474
121.6	0.562
124.9	0.783
129.0	0.954
132.2	0.906
140.0	0.966
151.7	0.927
153.5	0.815
161.6	0.603
170.0	0.447
193.6	0.342
202.2	0.273
255.9	0.241

DATA SET 8
T = 298.0

λ	ρ
2.0	0.077
4.9	0.084
10.2	0.085
14.5	0.078
20.0	0.079
25.2	0.073
30.1	0.073
35.2	0.060
39.9	[illegible]
44.9	0.054
46.8	0.047
48.9	0.020

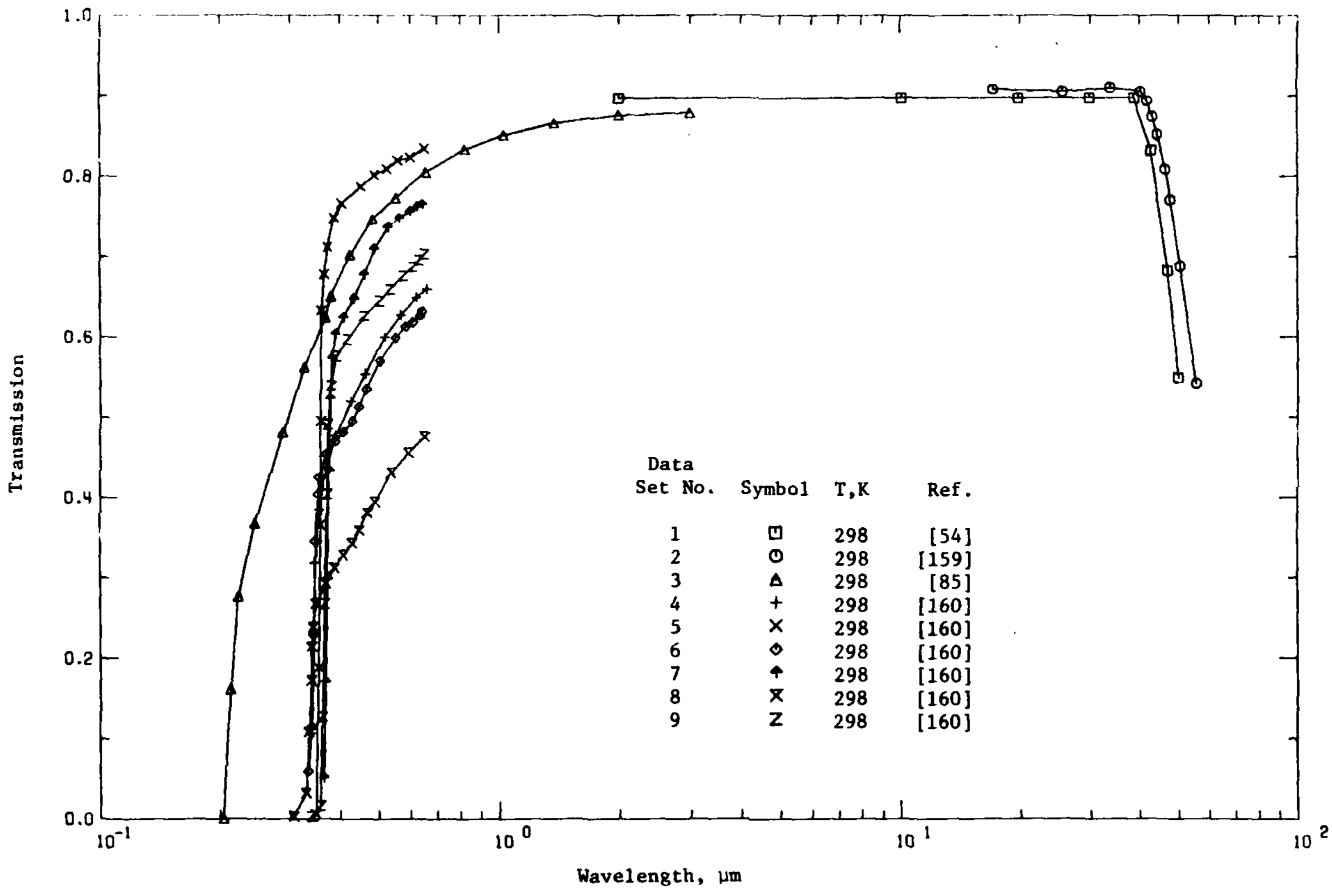

Figure 44. Transmission of Cesium Iodide

TABLE 69. SUMMARY OF MEASUREMENTS ON THE TRANSMISSION OF CESIUM IODIDE

Data Set No.	Ref. No.	Author(s)	Year	Method Used	Wavelength Range, μm	Temperature, K	Specifications and Remarks
1	54	McCarthy, D.E.	1963	T	2.00-50.00	298	Synthetic crystal; 1 cm thick; polished both sides; data extracted from a curve.
2	159	Plyler, E.K. and Blaine, L.R.	1960	T	17.2-55.5	298	High purity crystal; obtained from Harshaw Chemical Co.; 5 mm thick; data extracted from a curve.
3	85	McCarthy, D.E.	1967	T	0.203-3.00	298	Single synthetic crystal; 10 mm thick; polished; data extracted from a curve.
4	160	Viehmann, W., Arens, J.F., and Simon, M.	1974	T	0.33-0.67	298	Single crystal; plate specimen of 2.7 cm thick; not encapsulated; transmission measurements performed utilizing a HeNe laser of 1 mW output at 0.633 μm; data extracted from a figure.
5	160	Viehmann, W. et al.	1974	T	0.33-0.67	298	Similar to above except the specimen encapsulated in Si-oil and lucite.
6	160	Viehmann, W. et al.	1974	T	0.33-0.67	298	Similar to above except specimen of 5 cm thick and not encapsulated.
7	160	Viehmann, W. et al.	1974	T	0.33-0.67	298	Similar to above except specimen encapsulated.
8	160	Viehmann, W. et al.	1974	T	0.33-0.67	298	Similar to above except specimen of 2 cm thick and not encapsulated.
9	160	Viehmann, W. et al.	1974	T	0.33-0.67	298	Similar to above except specimen encapsulated.

TABLE 70. EXPERIMENTAL DATA ON THE TRANSMISSION OF CESIUM IODIDE

[Wavelength, λ, µm; Temperature, T, K; Transmission, τ]

DATA SET 1
T = 299.0

λ	τ
[illegible]	0.897
[illegible]	0.897
19.9	0.897
30.0	0.897
35.3	0.897
40.0	0.872
47.1	[illegible]
50.0	[illegible]

DATA SET 2
T = 298.0

λ	τ
17.2	[illegible]
25.7	[illegible]
32.9	[illegible]
40.4	[illegible]
41.8	[illegible]
43.2	0.874
44.4	0.852
46.5	[illegible]
49.0	0.770
53.7	0.693
55.5	0.542

DATA SET 3
T = 298.0

λ	τ
[illegible]	[illegible]
0.222	0.152
0.242	0.273
0.245	0.357
0.257	0.451
[illegible]	0.552
[illegible]	0.624
[illegible]	0.690
0.425	0.712
[illegible]	0.745
0.554	0.773
0.657	0.805

DATA SET 3(CONT.)

λ	τ
0.824	0.833
1.00	0.851
1.39	0.860
2.00	0.876
3.00	0.879

DATA SET 4
T = 298.0

λ	τ
0.334	0.106
0.340	0.318
0.354	0.354
0.369	0.437
0.390	0.477
0.420	0.520
0.443	0.554
[illegible]	[illegible]
0.571	0.627
[illegible]	0.649
[illegible]	0.661

DATA SET 5
T = 298.0

λ	τ
0.340	0.046
0.353	0.188
0.355	0.302
0.357	0.495
[illegible]	0.633
0.363	0.678
0.373	0.722
0.387	0.747
0.405	0.766
0.452	0.787
0.493	0.801
0.523	0.809
0.533	0.820
0.602	0.823
0.654	0.834

DATA SET 6
T = 298.0

λ	τ
0.332	0.059
0.339	0.124
0.342	0.229
0.346	0.345
0.352	0.434
0.355	0.425
0.369	0.454
0.389	0.473
0.408	0.481
0.423	0.495
0.445	0.513
0.465	0.535
0.514	0.573
0.551	0.599
0.585	0.613
0.612	0.618
0.636	0.623
0.645	0.632

DATA SET 7
T = 299.0

λ	τ
0.364	0.051
0.367	0.170
0.372	0.298
0.375	0.453
0.379	0.523
0.383	0.574
0.393	0.603
0.419	0.624
0.434	0.648
0.462	0.676
0.493	0.712
0.531	0.737
0.565	0.748
0.602	0.756
0.629	0.762
0.643	0.765

DATA SET 8
T = 298.0

λ	τ
0.325	0.063
0.327	0.032
0.334	0.148
0.338	0.172
0.339	0.214
0.341	0.238
0.345	0.267
0.368	0.293
0.384	0.312
0.413	0.325
0.430	0.343
0.448	0.359
0.469	0.381
0.489	0.394
0.538	0.431
0.594	0.455
0.652	0.476

DATA SET 9
T = 298.0

λ	τ
0.348	0.003
0.339	0.063
0.350	0.026
0.361	0.127
0.366	0.257
0.372	0.404
0.373	0.491
0.380	0.529
0.391	0.576
0.418	0.597
0.442	0.626
0.503	0.645
0.536	0.660
0.577	0.676
0.612	0.687
0.633	0.695
0.651	0.703

TABLE 71. PEAK POSITIONS (λ_{max}) IN μm AND HALF-WIDTHS (W) IN eV FOR THE F, R, M, AND N ABSORPTION BANDS IN CESIUM IODIDE*

Interionic dist., d (Å)	Temp.	F band λ_{max}	F band W	R_1 band λ_{max}	R_2 band λ_{max}	M band λ_{max}	M band W	N bands λ_{max}
3.95	RT	(0.778)‡						
		0.785	0.36			1.220	0.1	
	NT	0.750	0.23			1.185	0.05	

* Values were taken from Ref. [69].

$\ddagger$ Values given in parentheses are calculated from the Ivey relations [70].

F band $\lambda_{max} = 703\ d^{1.84}$ for NaCl structure, $\lambda_{max} = 251\ d^{2.5}$ for CsCl structure.

R_1 band $\lambda_{max} = 816\ d^{1.84}$

R_2 band $\lambda_{max} = 884\ d^{1.84}$

M band $\lambda_{max} = 1400\ d^{1.56}$

4. SUMMARY OF RESULTS AND RECOMMENDATIONS

The purpose of the present work is to survey and compile the available information on the absorption coefficient of alkali halides and to generate recommended values on the absorption coefficient in the infrared region. The results of this study are summarized below.

The Urbach rule appears to be generally applicable to the uv absorption edge of alkali halides. Measurements of absorption coefficients as a function of frequency at various temperatures, enable the establishment of the equations for the Urbach tails. These equations are useful in predicting the intrinsic absorption coefficients for these materials. Compared with the experimental results at the tails, this rule provides clues regarding the extent of impurity or defect in the samples. To ascertain if the Urbach rule can be extended into the transparent region requires experimental data on ultrapure samples. The current available data are less than adequate to provide such positive evidence.

In the highly transparent region, absorption coefficients are usually low. Since refractive indices in the transparent region can be measured accurately, the corresponding absorption coefficients can be calculated from the expressions

$$R = \frac{(n-1)^2 + k^2}{(n+1)^2 + k^2}$$

and

$$\alpha = 4\pi k\nu$$

It is clear that α can be determined provided that reliable reflectivity data are available. Such important data are currently missing as reflectivity measurements are concentrated in the fundamental uv absorption band and the reststrahlen region.

Available data in the multiphonon region indicate that the absorption coefficient can be expressed as an exponential function of frequency. Deutsch's results [12] supported the exponential dependence of the absorption coefficient on frequency for LiF, NaCl, KCl, and KBr; however, due to inadequate data, such a relation could not be developed for NaF and KI. However, we have found in this study that such an exponential relation can also be formulated for NaF and KI based on the following findings:

1. Listed below are the constant, ν_o, in Eqs. (23), (29), (32), and (35) for LiF, NaCl, KCl, and KBr, respectively, and their corresponding molecular weights, M, including those of NaF, KI, and CsI. In addition, the corresponding 1/M are also given.

	LiF	NaF	NaCl	KCl	KBr	KI	CsI
ν_o, cm^{-1}	153.2		56.0	50.8	39.1		
M, g $mole^{-1}$	26	42	58.5	74.5	120	166	260
1/M, $mole^{-1}g$	0.0385	0.0238	0.0171	0.0134	0.0083	0.0060	0.0038

A plot of log ν_o versus 1/M for LiF, NaCl, KCl, and KBr as shown in Figure 45 reveals that these four points can be approximated by a straight line. Based on this plot, the predicted values of ν_o for NaF, KI, and CsI are, respectively, 78.5 cm^{-1}, 35 cm^{-1}, and 32 cm^{-1}.

2. In the case of NaF, available data by Hohls [29] and Klier [41] (see Fig. 11) suggested a much higher value for ν_o. However, the data set obtained by McNelly and Pohl [80], read off from Figure 12, for a temperature of 300 K gave a value of 79.5 cm^{-1} for ν_o, closely in accordance with the predicted value 78.5 cm^{-1}. Careful review of their reports indicated that McNelly and Pohl used samples of extreme purity and they found no indications of any extrinsic absorption. Based on this evidence and the match of predicted ν_o value, we confidently adopted Eq. (26) to represent the absorption coefficient of pure NaF in the multiphonon region at room temperature.

3. In the case of KI, similar situations were encountered. Available data reported by Harrington et al. [104] were used to test the prediction. Indeed, a value of 35.1 cm^{-1} for ν_o was found and Eq. (38) was consequently adopted. In the case of CsI, unfortunately the current state of available data is inadequate either to substantiate the prediction or to define a unique value for ν_o.

With two additional points, those of NaF and KI, in Figure 45, there is little doubt to believe that log ν_o is proportional to 1/M in the form of equation

$$\nu_o = Ae^{B/M}$$

where A and B are constants. No attempt was made to assign numerical values to these constants until the physical meaning of this equation is understood.

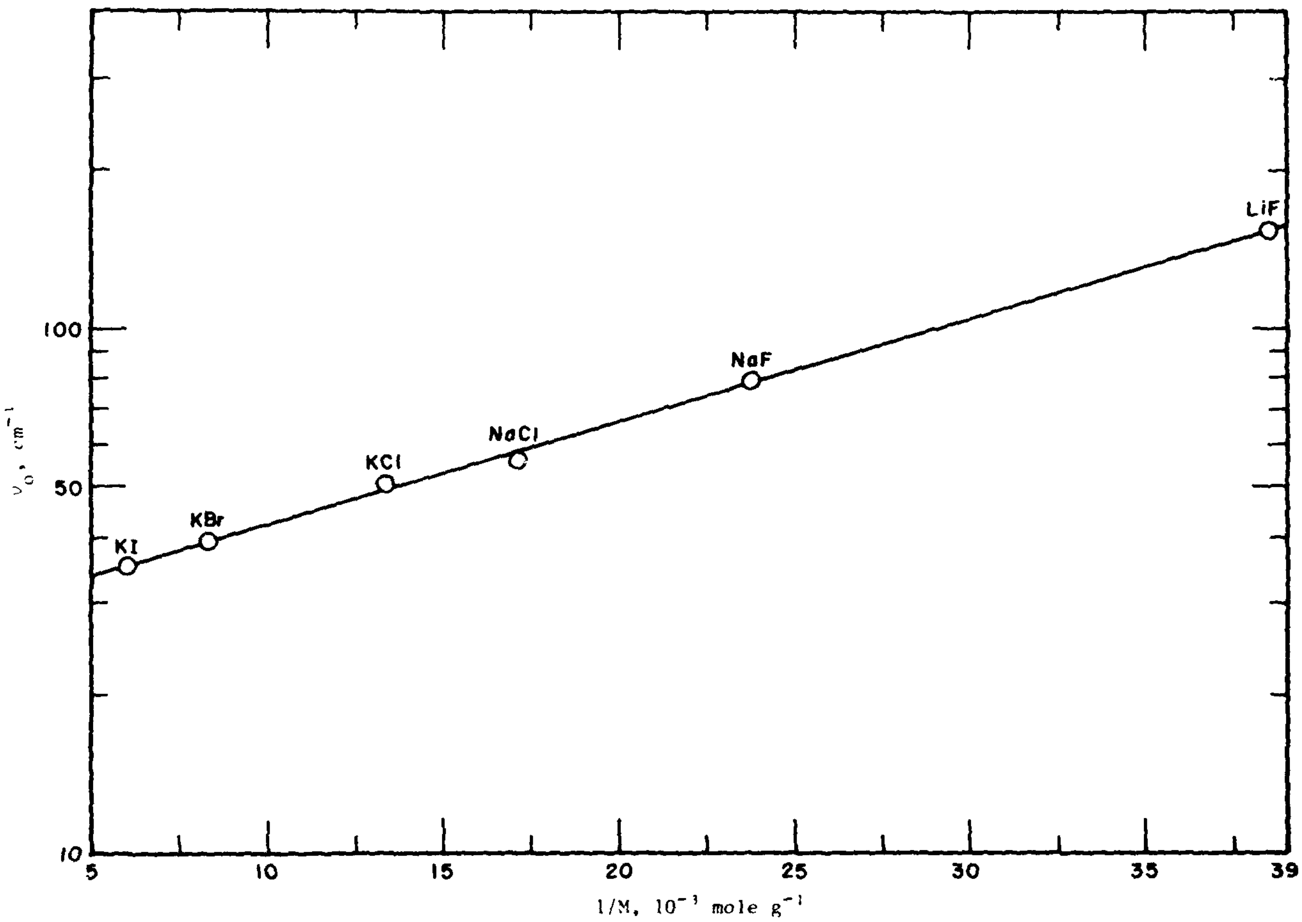

Figure 45. Semi-log Plot of ν_0 of Alkali Halides as a Function of 1/M

A close examination of the absorption spectra in the multiphonon region for LiF, NaCl, KCl, and KBr (shown in Figs. 5, 17, 23, and 29), one will appreciate the strong possibilities that analytical expressions similar to those for the Urbach tail region can be formulated for the multiphonon region. Results toward these ends will be presented in the second report of this study on alkali halides.

In the wavelength region of laser interest, absorption coefficients were made available at a few selected wavelengths. Although it appeared that absorption coefficients at some wavelengths, 10.6 μm for example, could be predicted by Eqs. (29), (32), and (35) in the cases of NaCl, KCl, and KBr, experimental data showed considerable discrepancies due to impurities and surface contaminations. Furthermore, determination of extreme low absorption is hampered by the limit of instrument sensitivity, hence the inevitable discrepancies. Many investigators treated the bulk and surface absorption as two separate parts and efforts have been made to identify them separately. As a result, very low bulk absorption coefficients (close to the intrinsic) were reported with surface absorption generally many times higher. In practice, however, the total absorption actually accounts for the objectionable effects at high-power levels. Natural consequences of this are numerous investigations aimed at eliminating or reducing the extrinsic contributions. Growing of crystals with the reactive-atmosphere process and cleaning the surface with various chemical techniques are two popular means that have been employed. To date, only modest success has been achieved.

Assignment of the bulk and surface origins of extrinsic absorption at 9.5 and 3.8 μm has been controversial. Some workers believe that surface contamination is the main cause of excess absorption; others think bulk impurities are the reason. No clear line can be drawn between these two views based on currently available information.

Some materials have relatively high intrinsic absorption at certain laser wavelengths. However, it has been made clear by the advances of laser technology that laser wavelengths are no longer limited to the 2-6 μm region and to 10.6 μm, the so-called chemical and CO_2 laser wavelengths. New developments have shown that laser action can be produced at other wavelengths in the near infrared, visible, near ultraviolet, and ultraviolet regions. Optical materials that are not suitable at certain wavelengths may be found to be important

at other wavelengths. It is clear, therefore, that well planned and systematic experimental investigation of absorption should be carried out, covering wide spectral and temperature ranges for a wide variety of optical materials.

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APPENDIX

The figures included in the Appendix are vuv absorption spectra of the seven materials which are presented in this report. For each data set, the purposes of the investigations, where the curve was taken from, differences for different spectral regions are specified. Some researchers were interested in the absolute values of absorption coefficients, some simply wanted to show the spectral structure. As a result, many workers adopted arbitrary (arb) units for the absorption coefficient (α). Since the purpose of including these figures is to provide the readers the supplemental parts of the complete absorption spectra, selected, typical results are plotted in a single scale and the appropriate scaling magnitudes are given in the legend.

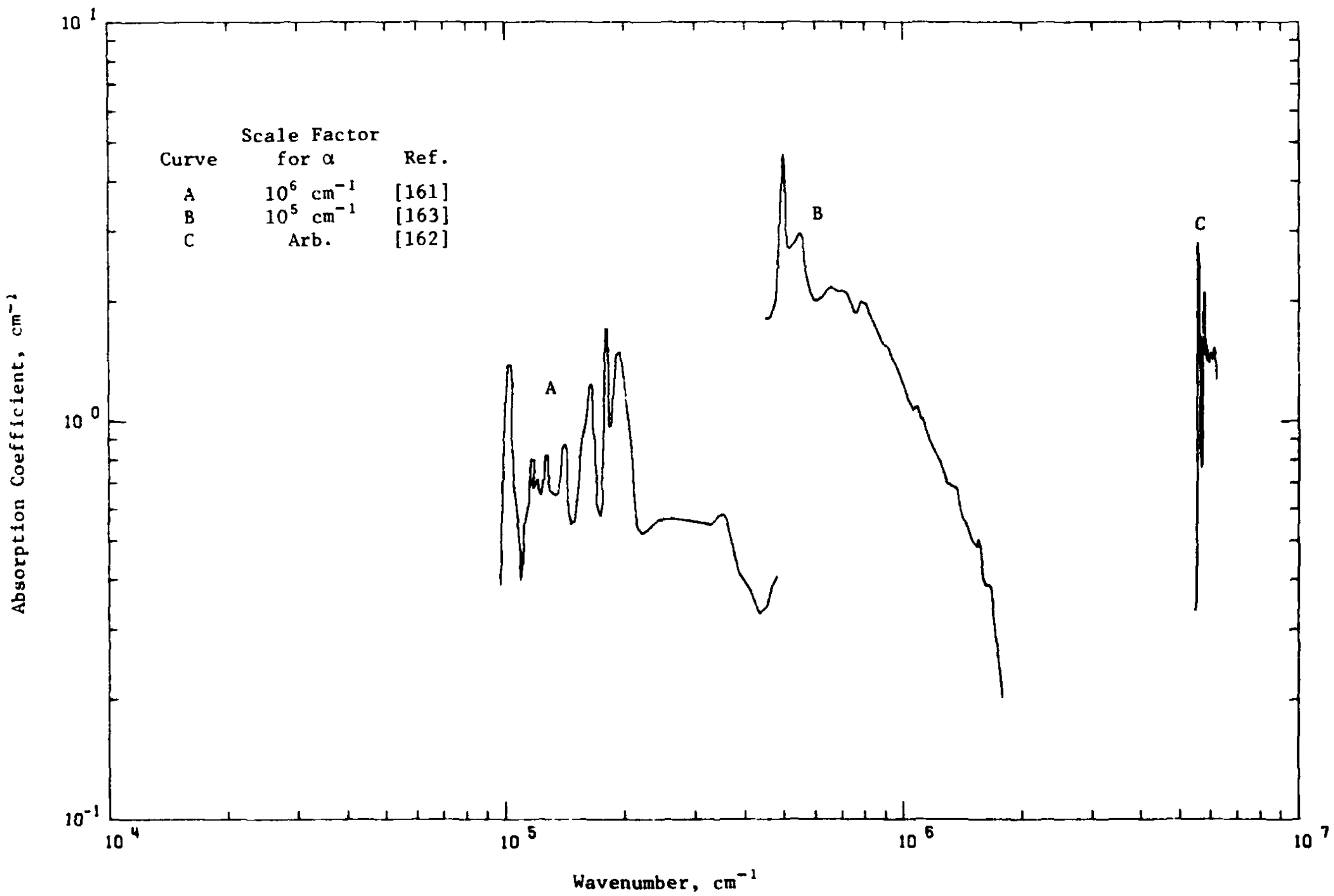

Figure A1. Absorption Coefficient of Lithium Fluoride in vuv Region

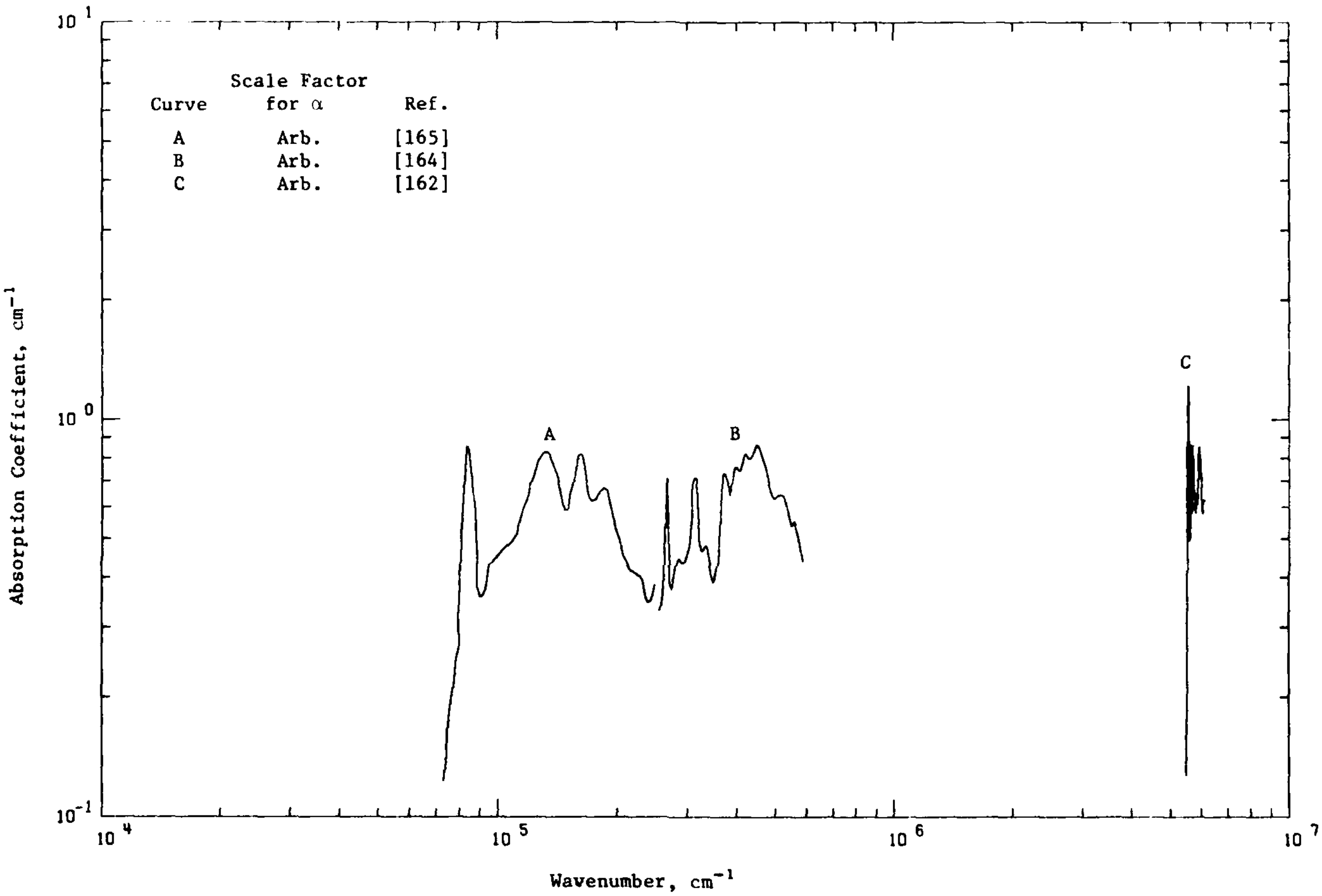

Figure A2. Absorption Coefficient of Sodium Fluoride in vuv Region

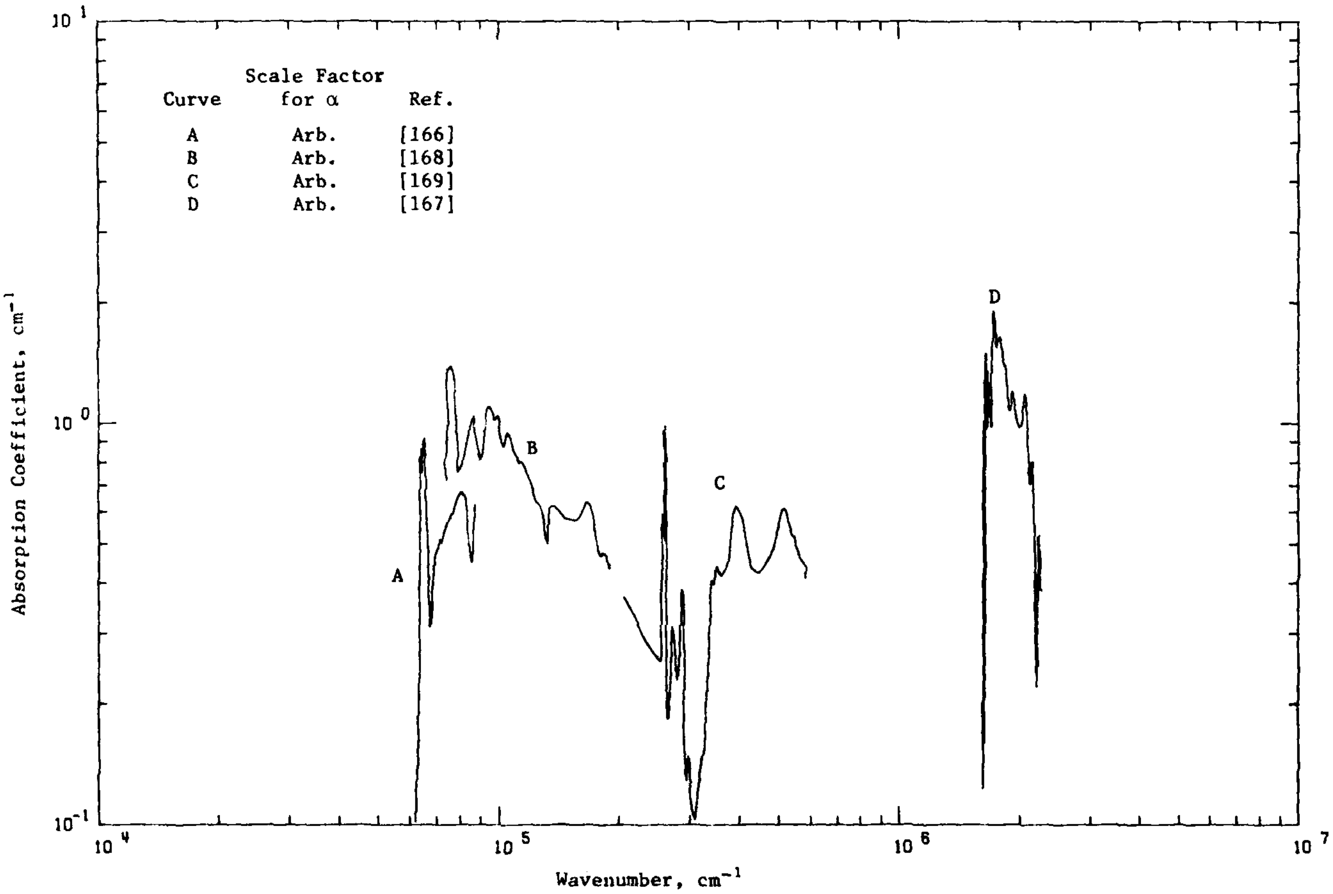

Figure A3. Absorption Coefficient of Sodium Chloride in vuv Region

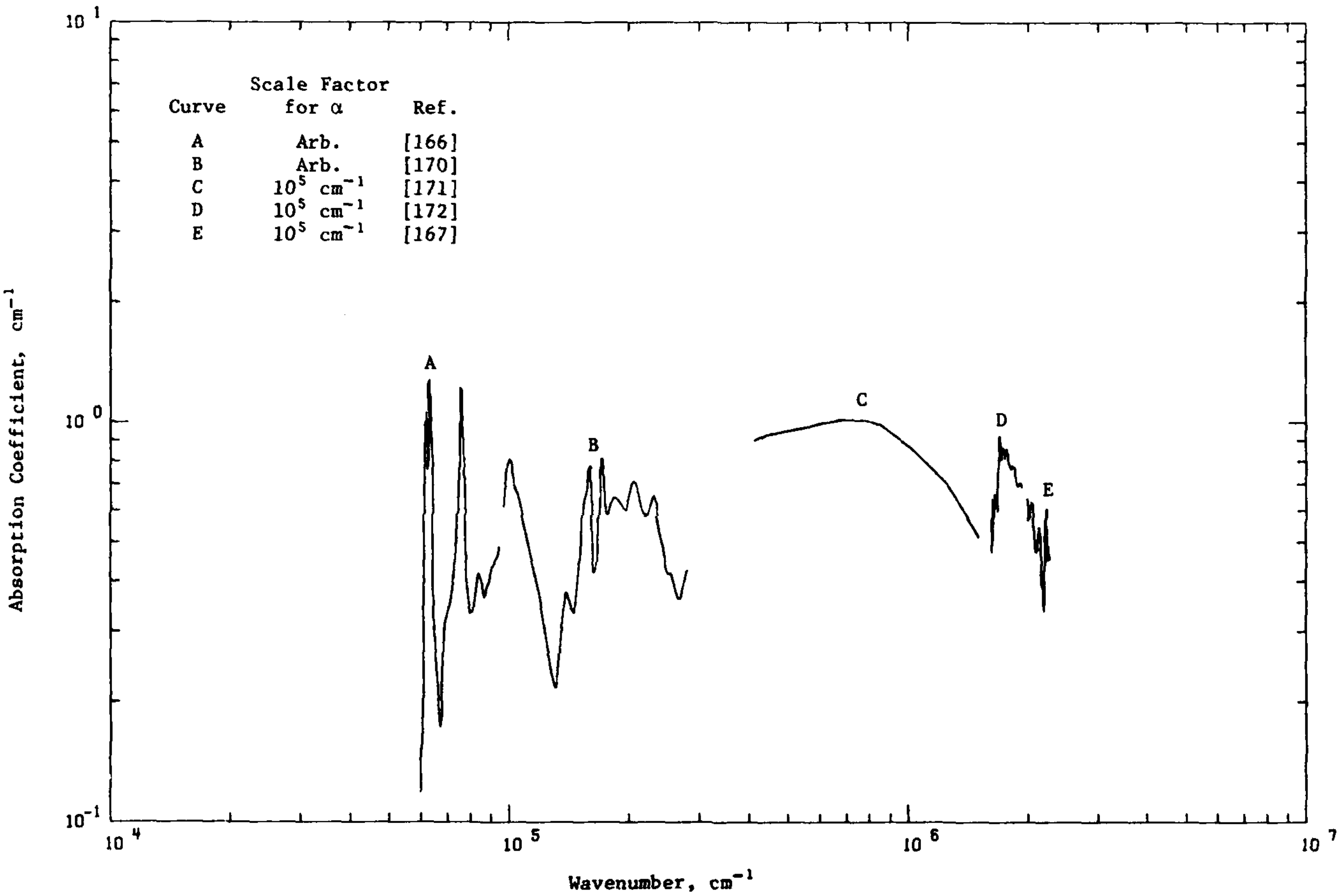

Figure A4. Absorption Coefficient of Potassium Chloride in vuv Region

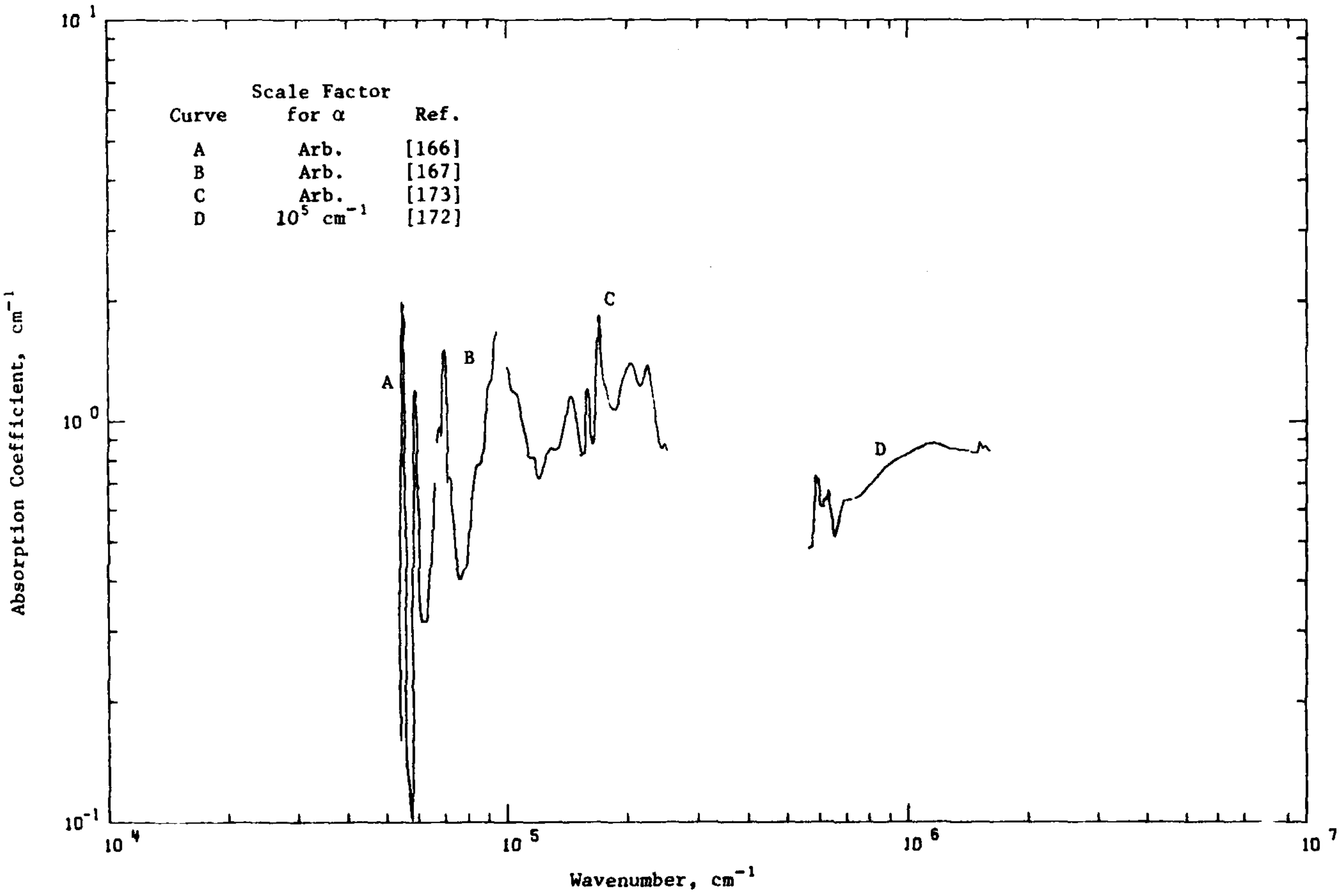

Figure A5. Absorption Coefficient of Potassium Bromide in vuv Region

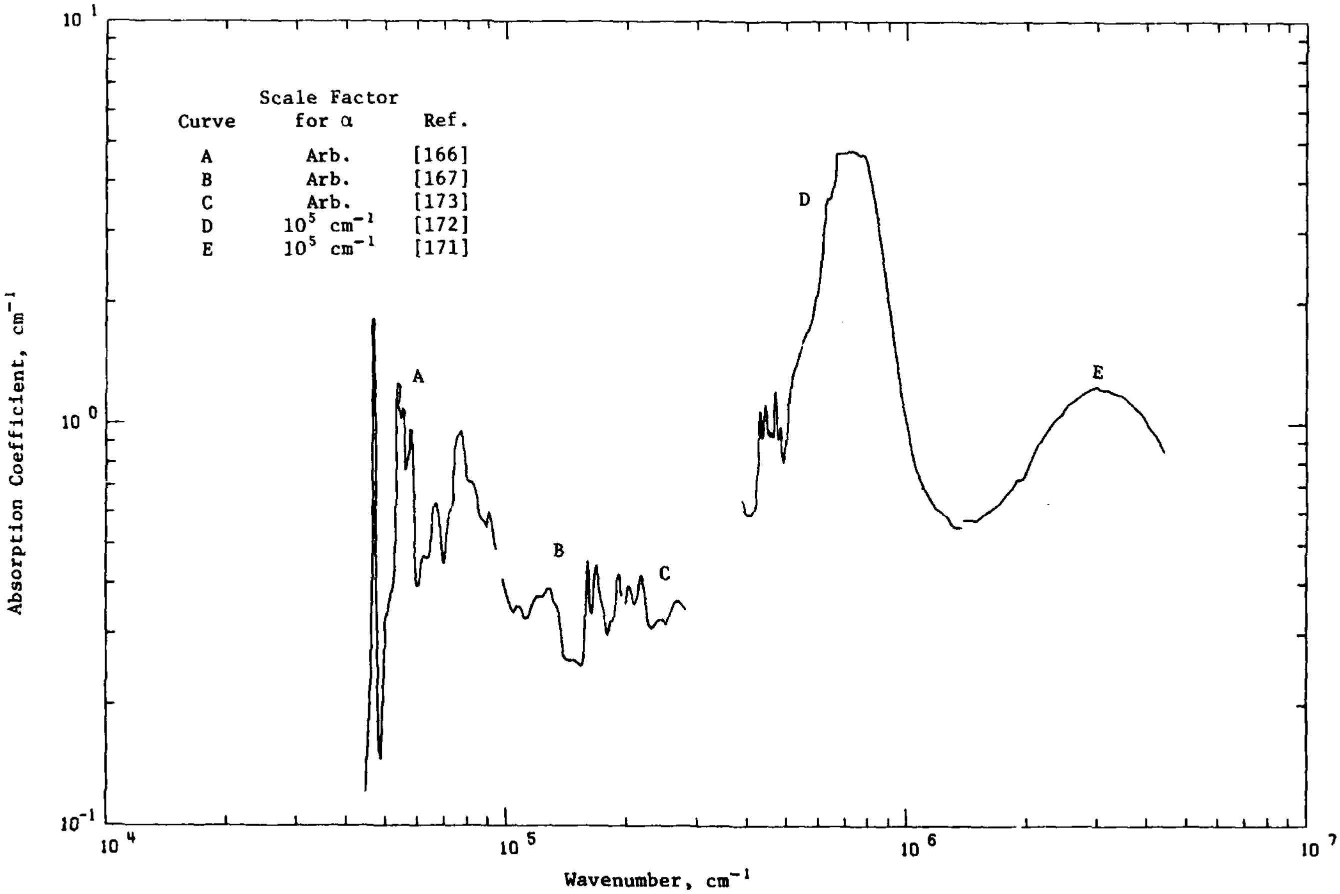

Figure A6. Absorption Coefficient of Potassium Iodide in vuv Region

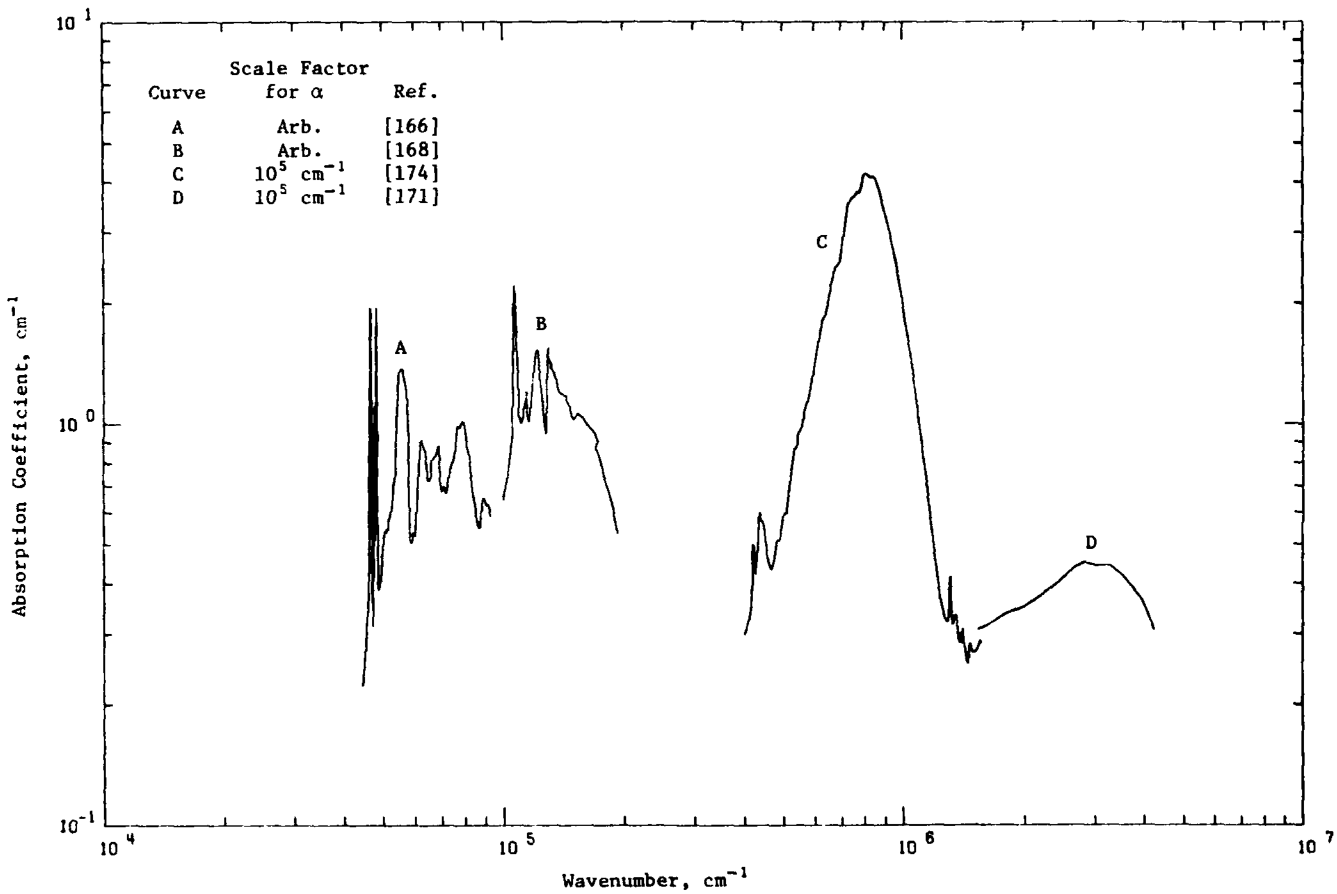

Figure A7. Absorption Coefficient of Cesium Iodide in vuv Region

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